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SECTION 19

**FORMAT: AN ENGINEER PROJECT ON MINEFIELD LAYING AND
BREACHING**

For :	Project Number :
BY : Capt xxx	Unit :
Appointment :	Date Time Group :

Reference:

- A. Bangladesh Map Sheets
- B. GSTP1626

<u>Time Z Used Tough out the Project:</u>	FOXTROT
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SUMMARY

1. **Aim.** To Support XXX Infantry brigade to take up defence in general area NATORE by laying minefield in the flank of defence location and further breaching minefield to facilitate move of own troupes.
2. **General Description of the site.**
 - a. Type of soil. Hard clay.
 - b. Cover and concealment. Available at the ground edges.
 - c. Approach. RAJSHAHI-BONPARA-BOGRA.
 - d. Obstacles. River BORAL.
3. **Effect of Weather.** Weather is hot, sunny and humid. Troops will require more water and more break. At night weather is abit cooler. If will further facilitate the work.
4. **Important Timings.**
 - a. No Move Before. 1700 hrs.
 - b. All Works to be completed by. 0530 hrs.
 - c. Dumping to be completed by. 1800 hours.
 - d. Last Light. 1830 hrs.
 - e. Setting out start time.
 - f. Troops to task timings.
 - (i) Time Available. 11 hrs per day.
 - (ii) Moon Light available. As per moon calculation.
5. **Limitations.**
 - a. Work Hours. 11 hrs.
 - b. Security. Provided from the brigade.
 - c. En Interference. Likely to take place at the time of breaching.
6. **Outline Plan.** Attached as Annex A.
7. **Summary of Cal.** Attached as Annex B.
8. **Detailed Cal.** Attached as Annex C.
9. **Work Party Table.** Attached as Annex D.
10. **Store List.** Attached as Annex E.

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11. **Tpt Schedule.** Attached as Annex F.
12. **Work Program.** Attached as Annex G.
13. **Job Pri List.** Attached as Annex H.

XXX
Capt
A/OC, XXX Fd Engr Coy

Annexes:

- A. Outline Plan
- B. Summary of Calculation.
- C. Detailed Calculation.
- D. Wk Party Table.
- E. Store List.
- F. Tpt Schedule.
- G. Work Program.
- H. Job Pri List.

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ANNEX A TO
SUMMARY TO
ENGINEER PROJECT ON
MINEFELD LAYING
ANDBREACHING

OUTLINE PLAN

1. **MISSION.** Support XXX Inf Bde in taking up def in gen area NATORE by laying Minefd and create a safe lane to facilitate own tps mov.

2. **EXECUTION.**

a. **Gen Outline.** Total op is carr out in two steps which incl minefd laying and minefd breaching. To facilitate task the gp is divided into Task Force A, Task Force B, Task Force C. The pri of jobs are:

(1) **Minefd Laying.**

- (a) Marshaling
- (b) Move to ground
- (c) Unlading
- (d) Carry
- (e) Digging
- (f) Wiring
- (g) IOE group

(2) **Minefd Breaching**

- (a) Setting out
- (b) Breaching
- (c) Pulling
- (d) Lane Marking

b. **Task Force-A.**

- (1) **Comd.** Pl Comd Pl-1
- (2) **Group.** xxx Fd Coy, Pl-1

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(3) Tasks.

- (a) Ld eqpts.
- (b) Move to grd.
- (c) Unload eqpts.
- (d) Carry mines.
- (e) Provide 1 group for IOE laying.
- (f) Provide setting out team in breaching.

c. **Task Force -B**

(1) Comd. Pl ComdPI-2

(2) Gp. xxx Fd Coy, PI-2

(3) Tasks.

- (a) Ld eqpts.
- (b) Mov to grd.
- (c) Unload eqpts.
- (d) Lay nuisance mines.
- (e) Provide Breaching parties.

d. **Task Force -C**

(1) Comd. Pl Comd PI-3

(2) Gp. xxx Fd Coy, PI-3

(3) Tasks.

- (a) Ld eqpts.
- (b) Mov to grd.
- (c) Unload eqpts..
- (d) Wire perimeter of minefd.
- (e) Provide Pulling party.

f. **Coordinating Instr.**

(1) Timings.

- (a) No Move Before 1700 hrs.
- (b) First Light 0530 hrs.
- (c) Last Light 1830 hrs.

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(2) Engr eqnt and store loc. SINGHA and BAGHA.

(3) Veh. Integral with 11 addl 3-ton lorries.

3. **SERVICE SUPPORT.**

a. Admin O. Will be issued later.

b. Med. First aid box will be carr and integral resources.

4. **COMMAND AND SIGNAL.**

a. Loc. Near starting strip marker during minefd laying and rear safe lane during minefd breaching.

b. Codeword. Will be issued later.

c. Nick Name. Will be issued later.

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ANNEX B TO
SUMMARY TO
ENGINEER PROJECT ON MINEFIELD
LAYING AND BREACHING

SUMMARY OF CAL

1. **Minefd Laying.**

- | | | |
|----|--------------------------|----------------|
| a. | <u>Start Time.</u> | 1830 hrs D-Day |
| b. | <u>Completion Time.</u> | 0006 D+1Day |
| c. | <u>Total Atk mine.</u> | 4640 |
| d. | <u>Total Apers mine.</u> | 5663 |
| e. | <u>Transport Reqr.</u> | 23 3ton lorry. |

2. **Minefd Breaching.**

- | | | |
|----|-------------------------|-----------------|
| a. | <u>Start Time.</u> | 1330 hrs D+1Day |
| b. | <u>Completion Time.</u> | 0043 hrsD+4Day |
| c. | <u>Tpt Reqr.</u> | Integral. |

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ANNEX C TO
SUMMARY TO
ENGINEER PROJECT ON MINEFIELD
LAYING AND BREACHING

DETAIL CAL
MINEFD LAYING

1. Given Data.

- a. Frontage = 2500^x
- b. Depth = 900^x
- c. Density = $1\frac{2}{3} = \frac{5}{3}$
- d. Number of mixed strip = 2
- e. Number of IOE group = 6
- f. Number of Cluster per group = 8
- g. Total turning points = 5 per strip
- h. 30% of the mixed clusters of the outer row of mixed strip is trip wired .
- j. Tpt available = 3xFd Engr pl.

2. Calculation.

- a. Number of Strips. We know,
Number of strips = desired density ÷ standard density
$$= \frac{5}{3} \div \frac{1}{3}$$
$$= 5$$

Number of mixed strip = 2
Number of Atk strip = (5-3) = 3

- b. Number of Cluster Per Strip. We know,
Cluster per strip = Frontage x Standard density
$$= 2500 \times \frac{1}{3}$$
$$= 833.33$$
$$\cong 834$$

c. Mines.

- (1) Atk mines. We know,
Number of Atk mines = {(number of mixed strip + number of Atk strip) X
Number of cluster per strip + number of IOE group X no of IOE cluster
per group} + 10%
$$= \{(2+3) \times 834 + 6 \times 8\} + 10\%$$
$$= 4218 + 10\%$$
$$= 4218 + 421.8$$
$$= 4639.8$$
$$= 4640 \text{ Atk mines.}$$

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- (2) **AP Mines.** We know,
Number of AP mines = (3x number of mixed strip x number of cluster per strip + 3 x number of IOE group x number of IOE cluster per group) + 10%
$$= (3 \times 2 \times 834 + 3 \times 6 \times 8) + 10\%$$
$$= 5148 + 10\%$$
$$= 5148 + 514.8$$
$$= 5662.8$$
$$\cong 5663 \text{ AP Mines}$$

3. **Store Calculation.**

a. **Pickets.**

- (1) **Long Picket.** We know,
Number of long pickets = $[\{(Frontage + 2 \times Depth) \div 20\} + 1] + 10\%$
$$= [\{(2500 + 2 \times 900) \div 20\} + 1] + 10\%$$
$$= \{(4300 \div 20) + 1\} + 10\%$$
$$= (215 + 1) + 10\%$$
$$= 216 + 21.6$$
$$= 237.6$$
$$\cong 238 \text{ Long pickets.}$$
- (2) **Short Pickets.** We know,
No of short pickets = $\{(Frontage \div 20 \times Total Troop + 2 \times \text{number of strips}) + (\text{number of strips} \times frontage \div 100) + (2 \times \text{no of IOE gps})\} + 10\%$
$$= \{(2500 \div 20 + 2 \times 5 \times 5 + 2 \times 5) + (5 \times 2500 \div 100) + (2 \times 6)\} + 10\%$$
$$= \{(125 + 50 + 10) + 125 + 12\} + 10\%$$
$$= 322 + 10\%$$
$$= 322 + 32.2$$
$$= 354.2$$
$$\cong 355 \text{ Short pickets}$$
- (3) **Barbed Wire.** We know,
Barbed wire coil = $(3 \times Frontage + 4 \times Depth) \div 100$
$$= (3 \times 2500 + 4 \times 900) \div 100$$
$$= 11100 \div 100$$
$$= 111 \text{ Barbed Wire Coil}$$
- (4) **Perimeter sign Posting.** We know,
Number of perimeter sign posting = $(2 \times Frontage + 2 \times Depth) \div 40 + 10\%$
$$= \frac{2 \times 2500 + 2 \times 900}{40} + 10\%$$
$$= 170 + 10\%$$
$$= 170 + 17$$
$$= 187 \text{ Perimeter sign posting}$$

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- e. **Tracing Tape.** We know,
 Number of roll of tracing tape reqr = (number of strips x frontage + 2 x depth+ Length of guide tape) + 50 +107

$$= (5 \times 2500 + 2 \times 900 + 200) + 50 + 10\%$$

$$= 14500 + 50 + 10\%$$

$$= 290 + 10\%$$

$$= 290 + 29$$

$$= 319 \text{ roll tracing tape}$$

 Note: Assumed guide tape = 200^x

4. **Transports.**

a. **Mines.**

- (1) We know, 440 Atk mine are carr in 1 3ton
 So, 4640 Atk mine sare carr in $\frac{4640}{440}$ 3 ton

$$= 10.55$$

$$\cong 11 \text{ 3ton lorry}$$
- (2) 4500 Apers mine no 6 are carr in 1 3ton lorry
 So, 5663 Apers mine no 6 are carr in $\frac{5663}{4500}$ 3ton lorry

$$= 1.26$$

$$\cong 2 \text{ 3ton lorry.}$$

(b) **Perimeter fencing.** Combination of the stores that 1 3 ton lorry can carry are:

- | | | |
|-----|-----------------|------------|
| (1) | Barbed wire | = 24 coil. |
| (2) | Long pickets | = 100 |
| (3) | Short pickets | = 50 |
| (4) | Perimeter signs | = 75 |

Now dividing it to the reqr number of items
 We get,

- | | | |
|-----|-----------------|--|
| (5) | Barbed wire | $111 \div 24$
$= 4.63 \cong 5 \text{ 3ton lorry}$ |
| (6) | Long pickets | $238 \div 100$
$= 2.38$
$\cong 3 \text{ 3ton lorry}$ |
| (7) | Short pickets | $355 \div 50$
$= 7.1$
$\cong 8$ |
| (8) | Perimeter Signs | $187 \div 75$
$= 2.49$
$\cong 3 \text{ 3ton lorry}$ |

Taking highest value, we get no of 3ton lorry reqr = 8 3ton

5. **For Personnel.**

Total manpower available = $3 \times 51 = 153$

28 person can be carr in 1 3ton lorry

So, 153 person can be carr in $\frac{153}{28}$

= 5.46

$\cong 6$ 3ton lorry

6. **Time Reqr.**

a. We are given with 3x Fd Engr Pl.

b. **Laying cap.**

(1) **Atk cluster.**

In moon lit = $3 \times 200 \times \frac{2}{3} = 400$ cluster per hr.

In dark night = $3 \times 200 \times \frac{1}{2} = 300$ cluster per hr.

(2) **Mixed cluster.**

In moon lit = $3 \times 100 \times \frac{2}{3} = 200$ cluster per hr.

In dark night = $3 \times 100 \times \frac{1}{2} = 150$ cluster per hr.

(3) **Tripped wire cluster.**

In moon lit = $3 \times 75 \times \frac{2}{3} = 200$ cluster/hr.

In dark night = $3 \times 75 \times \frac{1}{2} = 112.2$ cluster/hr.

$\cong 112$ cluster/hr.

c. **Moon Condition.**

(1) **D-Day.**

3rd qtr 3rd day moon light will not be upto = (52×3)
= 156 min.

(2) **D+ 1Day.**

3rd qtr 4th day
Moon light will not be upto = $(52 \times 4) = 208$ min.

d. **Outer Strip (Mixed Strip).**

$$\begin{aligned}
 \text{No of cluster} &= 834 \\
 \text{No of cluster in outer row} &= \frac{834}{2} = 417. \\
 \text{No of tripped wire in outer strip} &= 471 \times \frac{30}{100} \\
 &= 125.1 \\
 &\cong 126 \\
 \text{In dark night, 112 cluster tripped wire cluster laid in 60 min} \\
 \text{So, 126 cluster tripped wire cluster laid in} &= \frac{126 \times 60}{120} \text{ min} \\
 &= 67.5 \text{ min} \\
 &\cong 68 \text{ min} \\
 \text{Dark hour left} &= (156-68) = 88 \text{ min.} \\
 \text{In dark night,} \\
 \text{In 60 min cluster (mixed) laid} &= 150 \\
 \text{In 88 min cluster (mixed) laid} &= \frac{88 \times 150}{60} \text{ min} \\
 &= 220 \text{ min} \\
 \text{Left clusters} &= 834 - (126+220) \\
 &= 834-346 \\
 &= 488 \text{ clusters (mixed)} \\
 \text{In moon lit night,} \\
 \text{200 clusters is laid in 60 min} \\
 \text{So, 488 cluster is laid in} &= \frac{60 \times 488}{200} \text{ min} \\
 &= 146.4 \\
 &\cong 147 \text{ min} \\
 \text{Total time requirement} &= (156+147) \text{ min} \\
 &= 303 \text{ min} \\
 &= 5 \text{ hour } 3 \text{ min} \\
 \text{Time left with night} &= 11 \text{ hour}-5 \text{ } 3 \text{ min} \\
 &= 5 \text{ hour } 57 \text{ min.}
 \end{aligned}$$

e. **2nd Strip (Atk Strip)**

$$\begin{aligned}
 \text{Number of clusters} &= 834 \\
 \text{In moon lit,} \\
 \text{400 Atk clusters are laid in} &= 60 \text{ min} \\
 \text{834 Atk clusters are laid in} &= \frac{60 \times 834}{400} \\
 &= 125.1 \text{ min} \\
 &\cong 126 \text{ min} \\
 \text{Night hr left} &= 5 \text{ hr } 57 \text{ min} - 126 \text{ min} \\
 &= 3 \text{ hr } 51 \text{ min}
 \end{aligned}$$

f. **3rd Strip (Atk Strip)**

$$\begin{aligned}
 \text{Number of clusters} &= 834 \\
 \text{In moon lit,} \\
 400 \text{ Atk clusters are laid in} &= 60 \text{ min} \\
 834 \text{ Atk clusters are laid in} &= \frac{60 \times 834}{400} \\
 &= 125.1 \text{ min} \\
 &\cong 126 \text{ min} \\
 \text{Night hr left} &= 5 \text{ hr } 57 \text{ min} - 126 \text{ min} \\
 &= 1 \text{ hr } 45 \text{ min} \\
 &\cong 105 \text{ min}
 \end{aligned}$$

g. **4th Strip (Atk Strip)**

$$\begin{aligned}
 &\text{In moon lit,} \\
 &\text{In 60 min no of Atk mines laid} = 400 \\
 &\text{In 105 min on of Atk mines laid} = \frac{400 \times 105}{60} \\
 &= 700 \\
 \text{Clusters left} &= (834 - 700) \\
 &= 134
 \end{aligned}$$

The next mines will be laid in D+1 day

In dark night,

$$\begin{aligned}
 &300 \text{ cluster is laid in 60 min} \\
 \text{So, 134 cluster is laid in} &= \frac{60 \times 134}{300} \\
 &= 26.8 \text{ min} \\
 &\cong 27 \text{ min}
 \end{aligned}$$

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h. **Fifth Strip (Mixed Strip).**

$$\begin{aligned}\text{Dark hr left} &= (208-27) \text{ min} \\ &= 181 \text{ min}\end{aligned}$$

In dark nit,

$$\begin{aligned}112 \text{ tripped wire cluster laid in } &60 \text{ min} \\ 126 \text{ tripped wire cluster laid in } &= \frac{60 \times 126}{112} \\ &= 67.5 \text{ min} \\ &\cong 68 \text{ min}\end{aligned}$$

$$\begin{aligned}\text{Dark hr left} &= (181-68) \text{ min} \\ &= 113 \text{ min}\end{aligned}$$

In dark night,

$$\begin{aligned}\text{In } 60 \text{ min mixed cluster laid} &= 150 \\ \text{In } 113 \text{ min mixed cluster laid} &= \frac{150 \times 113}{60} \\ &= 282.5 \\ &\cong 282\end{aligned}$$

$$\begin{aligned}\text{Cluster left} &= 834 (126+282) \\ &= 426 \text{ mixed cluster.}\end{aligned}$$

In moon lit night,

$$\begin{aligned}200 \text{ cluster (mixed) is laid in } &60 \text{ min} \\ 426 \text{ cluster (mixed) is laid in } &= \frac{60 \times 426}{200} \\ &= 127.8 \text{ min} \\ &\cong 128 \text{ min}\end{aligned}$$

$$\begin{aligned}\text{Total time reqr} &= (181+128) \text{ min} \\ &= 309 \text{ min} \\ &= 5 \text{ hour } 9 \text{ min}\end{aligned}$$

MINE FIELD BREACHING

1. **Given Data.**

- a. Breaching lane = 8 x 900.
- b. Att troops = 2 x aslt pioneer pl.
- c. Last light = 1830 hours.
- d. First light = 0530 hours.

2. **Assumptions.**

- a. The men are fresh and of average proficiency.
- b. There is no en interference.
- c. The weather is reasonable.
- d. Stores do not have to be carr more than 200^x.

3. **Assumed.**

- a. Total efficiency = 3x Engineer platoon + 1 Engineer Platoon
= 4x Engineer Platoon.
- b. Time Reqr for nec org and rest for breaching op = 1 hr 24 min.

4. **Setting Out Party.** The start time for setting out is (336 min + 1 hr 24 min)
or 420 min (336 min is assumed to be the
completion time of the previous task)
or 7 hour later than last light D+1 day
There will be 15 segments of each 60^x length and 8^x width.
Wk hr aval = (11-7) = 4 hr.

Now,

(10) For setting box tape time reqr = 10 min

(11) For setting guide tape time reqr = $\frac{60}{90} \times 60$
= 40 min
So for setting 1st segment time reqr = 40+10
= 50 min.

(12) For setting X tape time reqr = 10 min

(13) For setting guide tape time reqr = $\frac{60}{90} \times 60$
= 40 min

So for setting upto 2nd segment time reqr = 50+10+40
= 100 min.

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$$(14) \quad \text{For setting X tape, time reqr} = 10 \text{ min.}$$

$$(15) \quad \text{For setting guide tape, time reqr} = \frac{60}{90} \times 60 \\ = 40 \text{ min.}$$

$$\text{So for setting upto 3rd segment, time reqr} = 100 + 10 + 40 \\ = 150 \text{ min.}$$

$$(16) \quad \text{For setting X tape time reqr} = 10 \text{ min.}$$

$$(17) \quad \text{For setting guide tape time reqr} = \frac{60}{90} \times 60 \\ = 40 \text{ min}$$

$$\text{So for setting upto 4th segment time reqr} = 150 + 10 + 40 \\ = 200 \text{ min.}$$

$$8. \quad \text{For setting X tape time reqr} = 10 \text{ min.}$$

Since 30 min left after this. This party will start after next day last light.

$$(18) \quad \text{Dark hr} = 5 \times 52 = 260 \text{ min.}$$

$$(19) \quad \text{For setting guide tape time reqr} = \frac{60}{90} \times 60 \times \frac{5}{6} \\ = 48 \text{ min}$$

$$\text{So for setting upto 5th segment time reqr} = 200 + 10 + 48 \\ = 258 \text{ min.}$$

$$11. \quad \text{For setting crossing tape, time reqr} = 10 \times \frac{6}{5} \\ = 12 \text{ min}$$

$$12. \quad \text{For setting guide tape time reqr} = \frac{60}{90} \times 60 \times \frac{5}{6} \\ = 48 \text{ min}$$

$$\text{For setting upto 6th segment time reqr} = 258 + 12 + 48 \\ = 318 \text{ min.}$$

$$13. \quad \text{For setting crossing tape time reqr} = 10 \times \frac{5}{6} \\ = 12 \text{ min}$$

$$14. \quad \text{For setting guide tape time reqr} = \frac{60}{90} \times 60 \times \frac{5}{6} \\ = 48 \text{ min}$$

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$$\begin{aligned}\text{For setting upto 7th segment time reqr} &= 318+12+48 \\ &= 378 \text{ min.}\end{aligned}$$

$$\begin{aligned}15. \quad \text{For setting x tape time reqr} &= 10 \times \frac{5}{6} \\ &= 12 \text{ min}\end{aligned}$$

$$\begin{aligned}16. \quad \text{For setting guide tape time reqr} &= \frac{60}{90} \times 60 \times \frac{5}{6} \\ &= 48 \text{ min}\end{aligned}$$

$$\begin{aligned}\text{For setting upto 8th segment time reqr} &= 378+12+48 \\ &= 438 \text{ min.}\end{aligned}$$

$$\begin{aligned}17. \quad \text{For setting x tape time reqr} &= 10 \times \frac{5}{6} \\ &= 12 \text{ min}\end{aligned}$$

$$\begin{aligned}\text{So dark hr left} &= 260-(48 \times 4 + 12 \times 4) \\ &= 260-240 \\ &= 20 \text{ min}\end{aligned}$$

$$\begin{aligned}18. \quad \text{In 20 min guide tape laid} &= \frac{90}{60} \times 20 \times \frac{5}{6} \\ &= 25^x\end{aligned}$$

$$\begin{aligned}\text{rest } (60-25)^x \text{ or } 35^x \text{ is laid in} &= \frac{60}{90} \times 35 \\ &= 23.33 \\ &\cong 24 \text{ min.}\end{aligned}$$

$$\begin{aligned}\text{For setting upto 9th segment time reqr} &= (438+12+20+24) \\ &= 494 \text{ min.}\end{aligned}$$

$$19 \quad \text{For setting x tape time reqr} = 10 \text{ min}$$

$$\begin{aligned}20 \quad \text{For setting guide tape time reqr} &= \frac{60}{90} \times 60 \\ &= 40 \text{ min.}\end{aligned}$$

$$\text{For setting this segment (10th segment) time reqr} = 50 \text{ min.}$$

$$\begin{aligned}20 \text{ For setting, } 11^{\text{th}}, 12^{\text{th}}, 13^{\text{th}}, 14^{\text{th}}, 15^{\text{th}} \text{ segment will reqr} &= (50 \times 5) \\ &= 250 \text{ min.}\end{aligned}$$

$$\text{So total time reqr upto } 15^{\text{th}} \text{ segment} = 15^{\text{th}} \text{ segment} = (494+50+250) = 794 \text{ min}$$

$$21 \text{ For setting finishing tape time reqr} = 10 \text{ min}$$

$$\begin{aligned}\text{So overall time reqr} &= 794 + 10 \\ &= 804 \text{ min by setting out party.}\end{aligned}$$

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5. **Basic Breaching Party-1.** This party will start when setting out party will lay guide tape upto 20^x

$$\text{Setting out party will go } 20^x \text{ in } = \frac{60}{90} \times 20 \\ = 13.3$$

$$\text{For easy cal we will start often (10+15) min of the setting out party} \\ = 25 \text{ min}$$

$$\text{So work time aval} \quad = 7 \text{ hour}-25 \text{ min.} \\ = 3 \text{ hour } 35 \text{ min}$$

- a. Breaching party will clear 60^x in 60 min.
- b. For breaching 2nd segment time reqr = 60 min.
- c. For breaching 3rd segment time reqr = 60 min.
- d. From 4th segment time left = 3 hr 35 min - 3x 60 min. \\ = 35 min

So, 4th segment will be left for next day breaching

$$\text{e. Dark night} \quad = 5 \times 52 \\ = 260 \text{ min}$$

$$\text{f. For breaching } 4^{\text{th}} \text{ segment time reqr} \quad = 60 \times \frac{6}{5} \\ = 72 \text{ min.}$$

$$\text{g. For breaching } 5^{\text{th}} \text{ and } 6^{\text{th}} \text{ segment time reqr} = 72 \times 2 = 144 \text{ min} \\ \text{Dark hr left} \quad = 260 - (72 + 144) \\ = 44 \text{ min.}$$

$$\text{h. In 44 min breaching can be done} \quad = 44 \times \frac{5}{6} \\ = 36.67 \\ \cong 36^x$$

$$\text{Left } (60-36)^x \text{ or } 24^x \text{ can be breaching in } = 24 \times \frac{60}{60} \\ = 24 \text{ min.}$$

$$7^{\text{th}} \text{ segment is completed with overall time} = (3 \times 60 + 72 + 2 \times 72 + 44 + 24) \\ = 464 \text{ min.}$$

$$\text{j. Night time left} \quad = 11 \text{ hr} - (260 \text{ min} + 24 \text{ min}) \\ = 11 \text{ hr} - 284 \text{ min} \\ = 6 \text{ hour } 16 \text{ min.}$$

$$\text{k. Time reqr to breach } 8^{\text{th}} \text{ segment} = \frac{60}{60} \times 60 \\ = 60 \text{ min}$$

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- l. Time reqr to breach 9th, 10th, 11th, 12th and 13th segment = 5×60 min
 $= 300$ min
 So total time reqr to breach upto 13th segment = $(464 + 60 + 300)$
 $= 824$ min
 Time left = 6 hour 16 min - 360 min
 $= 16$ min.
 So 14th segment will start from next day.
- m. Dark hr left = 6×52
 $= 312$ min.
- n. Time reqr to breach 14th segment = $\frac{60}{60} \times 60 \times \frac{6}{5}$
 $= 72$ min.
 Total time reqr = $824 + 72 \times 2$
 $= 968$ min
 $= 16$ hr 8 min.

6. **Basic Breaching Party-2.** This party will start when BBP-1 will advance 20^x

Time reqr to breach 20^x = $\frac{60}{60} \times 20 = 20$ min

So, it will start often (20+25) on 45 min of setting out party.

wk time aval = 4 hr - 45 min
 $= 3$ hr 15 min

- a. For breaching 2nd, 3rd segment time reqr = $\frac{60}{60} \times 60$
 $= 60$ min
- b. For breaching 2nd, 3rd segment time reqr = $\{\frac{60}{60} \times 60\} \times 2$
 $= 120$ min
- c. From 4th segment time left = 3 hr 15 min - $(60 + 120)$ min
 $= 15$ min
 So 4th segment will start from next day
- d. When, BBP-1 will breach 20^x next day they will start.
 Time reqr to breach 20^x = $20 \times \frac{6}{5}$
 $= 24$ min
- e. Dark hr left = $(260 - 24) = 236$ min
- f. Time reqr to breach 4th segment = $60 \times \frac{6}{5}$
 $= 72$ min.
- g. Time reqr to breach 5th and 6th segment = $72 \times 2 = 144$ min
- h. In 20 min, breaching done = $20 \times \frac{5}{6}$
 $= 16.67$
 $\cong 16^x$
 Left $(60 - 16)^x$ on 44^x is breached in = $44 \times \frac{60}{60}$
 $= 44$ min

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7th segment is completed at $(30 \times 60 + 24 + 72 + 2 \times 72 + 20 + 44) = 484$ min
Night time left $= 11 \text{ hr} - (260 + 44) \text{ min}$
 $= 5 \text{ hr } 56 \text{ min.}$

j. Time reqr to breach 8th, 9th, 10th, 11th and 12th Segment
 $= 60 \times 5 \text{ min.}$
 $= 300 \text{ min.}$
Time left $= 5 \text{ hr } 56 \text{ min} - 300 \text{ min.}$
 $= 56 \text{ min.}$

So, the work will start from next day from 13th segment

So, Time reqr to breach 13th, 14th 15th segment $= \left(\frac{60}{60} \times 60 \times \frac{6}{5} \right) \times 3$
 $= 72 \times 3$
 $= 216 \text{ min.}$

So total time reqr $= 484 + 300 + 216$
 $= 1000 \text{ min}$
 $= 16 \text{ hr } 40 \text{ min.}$

7. **Basic Breaching Party-3.** This party will start when BBP-2 will adv20^x

Time reqr to breach 20^x $= \frac{60}{60} \times 20 = 20 \text{ min.}$

So, this party will start often $= (45 + 20) + 65 \text{ min of setting out party.}$

Wk time aval $= 4 \text{ hr} - 65 \text{ min.}$
 $= 175 \text{ min.}$

a. Time reqr to breach 1st and 2nd segment $= \left(\frac{60}{60} \times 60 \right) \times 2 = 120 \text{ min.}$
Time left $= 175 - 120 = 55 \text{ min}$
So, 3rd segment breaching will start from next day.

b. Dark hr aval $= 5 \times 52 = 260 \text{ min.}$

c. Time reqr to breach 3rd, 4th, 5th, segment is $= \left(60 \times \frac{6}{5} \right) \times 3$
 $= 72 \times 3$
 $= 216 \text{ min}$
Dark hour left $= (260 - 216)$
 $= 44 \text{ min.}$

d. In 44 min, breaching done $= 44 \times \frac{5}{6}$
 $= 36.67$
 $\cong 36^x$

e. Left $(60 - 36)^x$ or 24^x is breached in $= 24 \text{ min.}$
6th segment completed by $= 2 \times 60 + 3 \times 72 + 44 + 24 = 404 \text{ min.}$

Night time left $= 11 \text{ hr} - (260 + 24) \text{ min}$
 $= 6 \text{ hr } 16 \text{ min.}$

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- f. Time reqr to breach, 7th, 8th, 9th, 10th,
11th 12 the segment = 60×6
= 360 min.
Time left = 6hr 16 min - 360 min.
= 16 min.

So, the 13th segment will start from next day.

- g. Time to go BBP-2, $20^x = 20 \times \frac{6}{5}$
= 24 min.

So 13th segment will start from total work,
(404 + 360 + 24) = 788

- h. Time reqr to breach 13th 14th 15th segment = $60 \times \frac{6}{5} \times 3 = 216$ min
j. Total time reqr = 1004 or 16 hr 44 min.

8. **Basic Breaching Party-4.** This party will start when BBP-3 will adv
upto 20^x

Time reqr to adv $20^x = \frac{60}{60} \times 20 = 20$ min.

This party will start often = (65+20) = 85 min of setting out party.

wk time aval = 4 hr - 85 min
= 155 min

- a. Time reqr to breach 1st and second segment = $\frac{60}{60} \times 60 \times 2 = 120$ min.

Time left = 155-120 = 35 min

So, 3rd segment will start from next day

- b. Dark night aval = $5 \times 52 = 260$ min.

- c. Time reqr to adv 20^x of BBP-3 = $20 \times \frac{6}{5}$
= 24 min.

- d. Time reqr to breach 3rd, 4th, 5th segment
= $(60 \times \frac{6}{5}) \times 3 = 72 \times 3 = 216$ min.

Dark night left = 260 (216+24) min.
= 20 min.

- e. In 20 min breaching done = $20 \times \frac{5}{6}$
= 16.67
 $\cong 16^x$

- f. left $(60-16)^x$ or 44^x is breached in $\frac{60}{60} \times 44$ min.

6th segment completed by = $2 \times 60 + 3 \times 72 + 44 + 20 + 24 = 424$ min.

Night time left = 11 hr - (200+44)
= 11 min - 5hr 4 min.
= 5 hr 56 min.

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g. Time reqr to breach 7th, 8th, 9th, 10th, 11th

$$\text{Segment} = 60 \times 5 = 300 \text{ min.}$$

$$\begin{aligned} \text{Time left} &= 5 \text{ hr } 56 \text{ min} - 300 \text{ min} \\ &= 56 \text{ min.} \end{aligned}$$

So 12th Segment will start from next day

$$\begin{aligned} \text{Upto 12th segment total work} &= (424 + 300) \\ &= 724 \text{ min.} \end{aligned}$$

h. Time reqr to breach 12th, 13th, 14th and 15th Segment

$$= 60 \times \frac{6}{5} \times 4 = 4 \times 72 = 288 \text{ min.}$$

$$\begin{aligned} \text{Total time reqr} &= (124 + 288) \text{ min} \\ &= 1012 \text{ min on } 16 \text{ hr } 52 \text{ min.} \end{aligned}$$

9. **Pulling Party.** This party will start when all breaching is done and start time in 288 later than last light in D+4 day. Day dark night aval= $312 - 288 = 24 \text{ min}$

$$\begin{aligned} \text{Number of mine} &= \text{Frontage} \times \text{Density} \\ &= 8 \times \frac{5}{3} \\ &= 13.33 \\ &\cong 14 \end{aligned}$$

In dark night

$$5 \text{ min reqr to pull } 3 \text{ mines} \times \frac{5}{6}$$

$$\begin{aligned} \text{or, } 24 \text{ min reqr to pull} &= 3 \times \frac{5}{6} \times \frac{24}{5} \\ &= 12 \text{ mines} \end{aligned}$$

$$\begin{aligned} \text{In moon lit night, 2 mines is lifted in} &= \frac{5}{3} \times 2 \\ &= 3.33 \\ &\cong 4 \text{ min} \end{aligned}$$

10. **Marking Lane.** Time reqr for 1 Pl to mk 120^x is = 30 min

$$\begin{aligned} \text{so, time reqr for 4 Pl to mk } 900^x &= 30 \times \frac{900}{120} \times \frac{1}{4} \\ &= 5625 \\ &\cong 57 \text{ min} \end{aligned}$$

11. **Time reqr.** time will be upto $312 + 4 + 57 \text{ min}$
or 375 min after last Lt D+4 day.

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ANNEX D TO
SUMMARY TO
ENGINEER PROJECT ON MINEFIELD
LAYING AND BREACHING

WK PARTY TABLE

1. Wk party table is given below:

Serial	Task Force No	Strength	Unit to provide	Task	Remarks
1.	A	1x Platoon	Platoon-1	Carr mines and IOE laying	
2.	B	1x Platoon	Platoon-2	Digholes for mines	
3.	C	1x Platoon	Platoon-3	Perimeter fencing	
4.	A	1x Platoon	Platoon-1	Setting out in Breaching	
5.	B	1x Platoon	Platoon-2	Breaching in detecting	
6.	C	1x Platoon	Platoon-3	Pulling party in breaching	

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ANNEX TO
SUMMARY TO
ENGR PROJ ON MINEFD
LAYING AND BREACHING

STORE LIST

1. Store is listed below:

Serial	Items	Setting out Party	BBP-1	BBP-2	BBP-3	BBP-4	Pulling Party	Mk Party	Remarks
1.	Prodder	3	3	3	3	3	2	-	
2.	Eye protection	3	5	5	5	5	5	-	
3.	wire cutter	1	3	3	3	3	-	-	
4.	Mine marker	10	10	10	10	10	-	-	
5.	Mine detector	1	1	1	1	1	-	-	
6.	Safety pin for mine	10	10	10	10	10	-	-	
7.	Tracing Tape	1100x	-	-	-	-	100x	-	
8.	Trip wire feeler	1	1	1	1	1	-	-	

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ANX F TO
SUMMARY TO
ENGR PROJ ON MINEFD
LAYING AND BREACHING

TRANSPORT SCHEDULE

Serial	Types of Veh	Quantity	Types of Ld	From		To		Remarks
				RV	Time	RV	Time	
1.	3 ton	14	Store and men	SINGHA	1330	NATORE	1430	
2.	3 ton	14	Store and men	BAGHA	1130	NATORE	1830	
3.	Jeep	1	men	NATORE	All time	NATORE	All time	
4.	Ambulance	1	men	NATORE	All time	NATORE	All time	
5.	Pickup	1	Admin	NATORE	1330	SNGHA	1430	

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ANX G TO
SUMMARY TO
ENGR PROJ ON MINEFD
LAYING AND BREACHING

WK PROG

Serial	Job	Privet	Unit	Time		Remarks
				RV	Time	
1.	Estb Stores	1	All	1430	1830	
2.	Laying outer strip	2	Task Force A	1830	2333	
3.	Laying other strips	3	Task Force B &Task Force C			
4.	Setting out	4	Task Force A			
5.	Basic Breaching	5	Task Force B			
6.	Pulling	6	Task Force C			
7.	Mk Lanes	7	All			

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ANX H TO
SUMMARY TO
ENGR PROJ ON MINEFD
LAYING AND BREACHING

JOB PRI LIST

1. Job pri list is given below:

Serial	Job	Private	Composition	Time Requirement	Remarks
1.	Estb Stores	1	All	4 hour	
2.	Laying outer strip	2	Task Force A	303 min	
3.	Laying other strips	3	Task Force B, Task Force C	693 min	
4.	Setting out	4	Task Force A	804 min	
5.	Basic Breaching	5	Task Force B	1012 min	
6.	Pulling	6	Task Force C	28 min	
7.	Mk Lanes	7	All	57 min	