N 5019

Engineer Technical Bull. # ~~27~~ #22

8 Aug 1944

[redacted]

ENGINEER HEADQUARTERS, FIFTH ARMY
A. P. O. #464, U. S. ARMY

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By Authority of
CG, Fifth Army
Initials JOB
Date 6 - Aug 44

8 August 1944

ENGINEER TECHNICAL BULLETIN NO. 22

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N-5019

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Make Buck Slip

Classification changed to [redacted] by authority of [redacted] G-2, WDGS

SEP 0945

for Colonel, Infantry

I. MINES, BOOBY TRAPS AND DEMOLITIONS

1. Firing Pressure of German Holzmines: During mine lifting operations north of ORTONA, a number of German Holzmines were lifted that had been buried for a lengthy period. It was found that the dowels supporting the shearing platform were damp, thus reducing their strength. The firing pressure is usually given as 200 pounds, but when the mine is in the condition described above, it will readily operate at a pressure of 50 pounds or less. (Source: AAI Information Series, Serial 14)

2. Enemy Demolitions: The following is an extract from an order issued by Field Marshal KESSELRING to Group HOFFMANN, and dated 13 June 1944, which was recently captured in the IV Corps sector. It indicates that our engineering problems in the future will be no less than they have been in the past.

"Demolitions of every kind must more than ever be executed with sadistic imaginativeness. Under the guidance of the last engineers to leave the area, working with troops of other branches of the service who have been trained in this work, every street, every bridge or other construction will be totally destroyed. Houses, the demolition of which will block narrow village streets will be blown up." (Source: Fifth Army G-2 Report No. 291)

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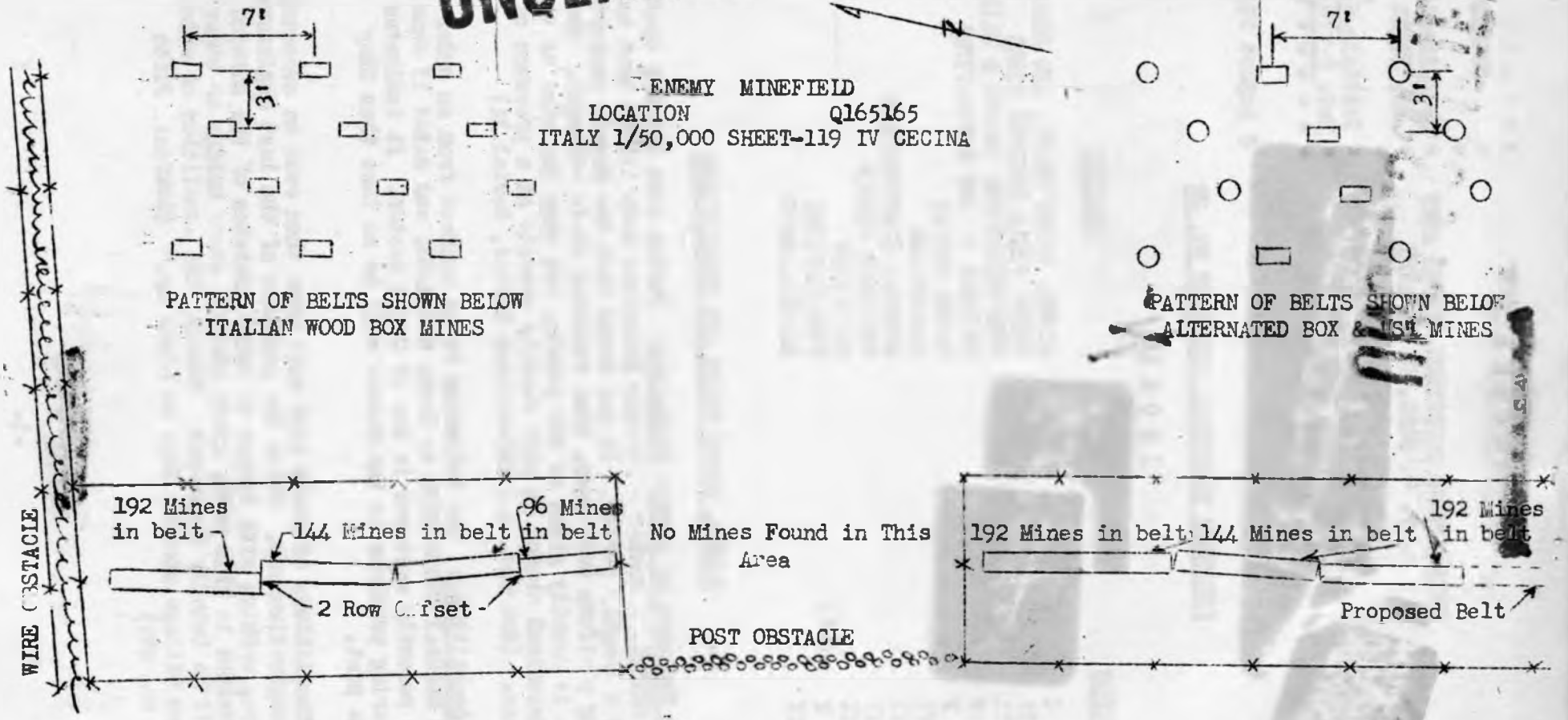
3. Enemy Minefield Pattern: The sketch below shows the pattern of a minefield, located at Q165165, near CECINA, which was cleared by the 814th Engineer Avn. Bn.



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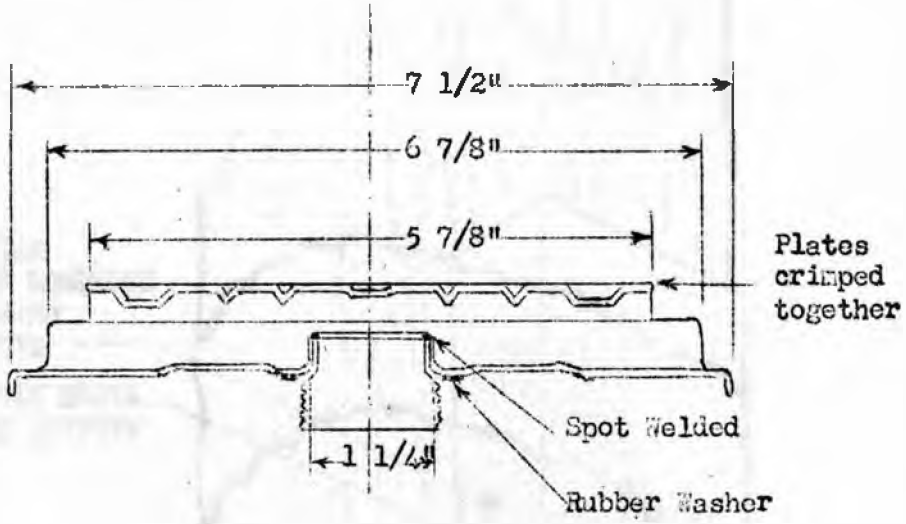
4. German Improvised Anti-lifting Device: Reference Fifth Army Engineer Technical Bulletin No. 21, para I, 6, a copy of the German document referred to therein has been captured in NORMANDY. This indicates that the Germans are giving a wide distribution to their new drill of laying tellermines upside down. The C.R.E., 1st Division (Br) reported finding a minefield of this type at LIDO DI ROMA, the tellermines being placed on two wooden slats, though none of the mines were reported booby-trapped. To date, none of these new improvised anti-lifting devices have been reported found.

5. Modifications in T.Mi. 43:

a. A report has been received of a T.Mi. 43 with a pressure plate of only 3" - 4" in diameter. No further details are known. (Source: C.E., AAI)

b. The following sketch shows a new modification to the mushroom plate for the T.Mi. 43 which has been found in the Eighth Army sector.



TYPICAL SECTION

c. The 16th Armd Engineer Bn. reported finding several T.Mi. 43's in the area of CHIUSDINO which contained no sockets for attaching anti-lifting devices.

6. German Method of Felling Trees: The 16th Armd. Engineer Bn. reports finding trees, prepared for felling as indicated in the following sketch:

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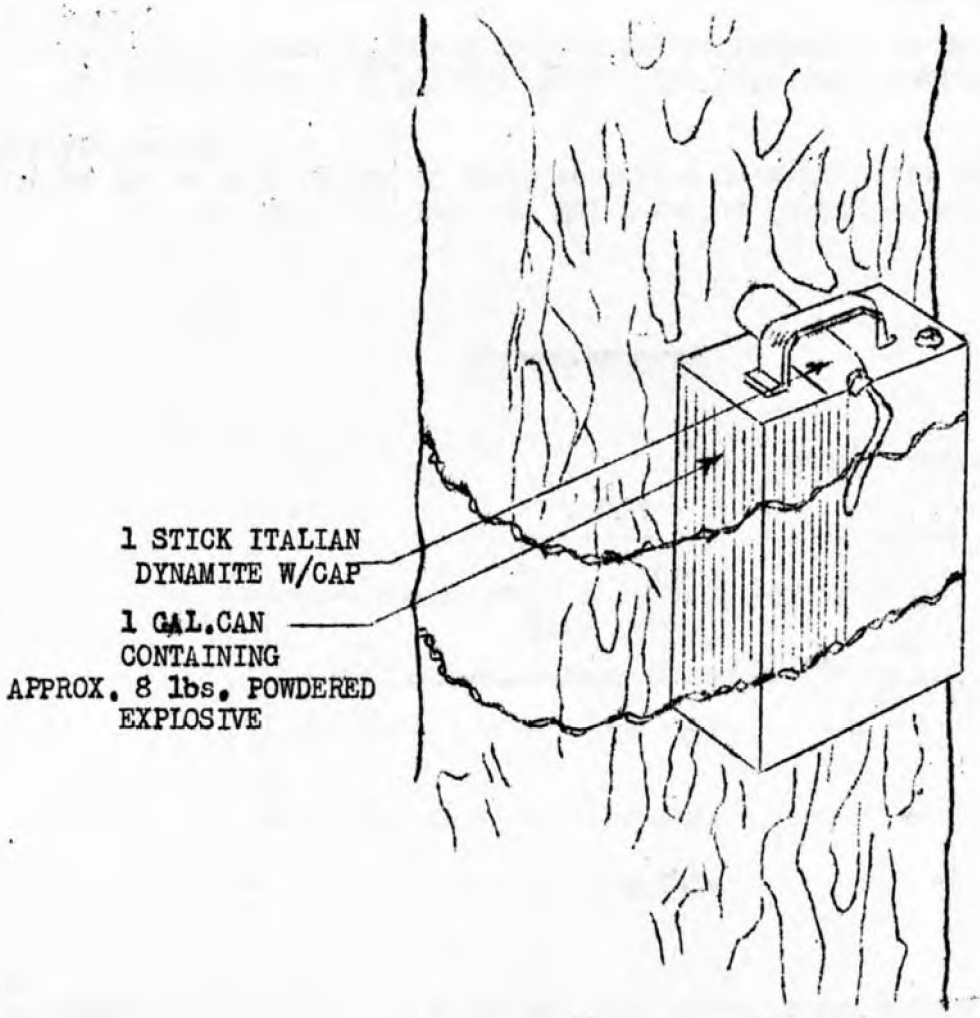
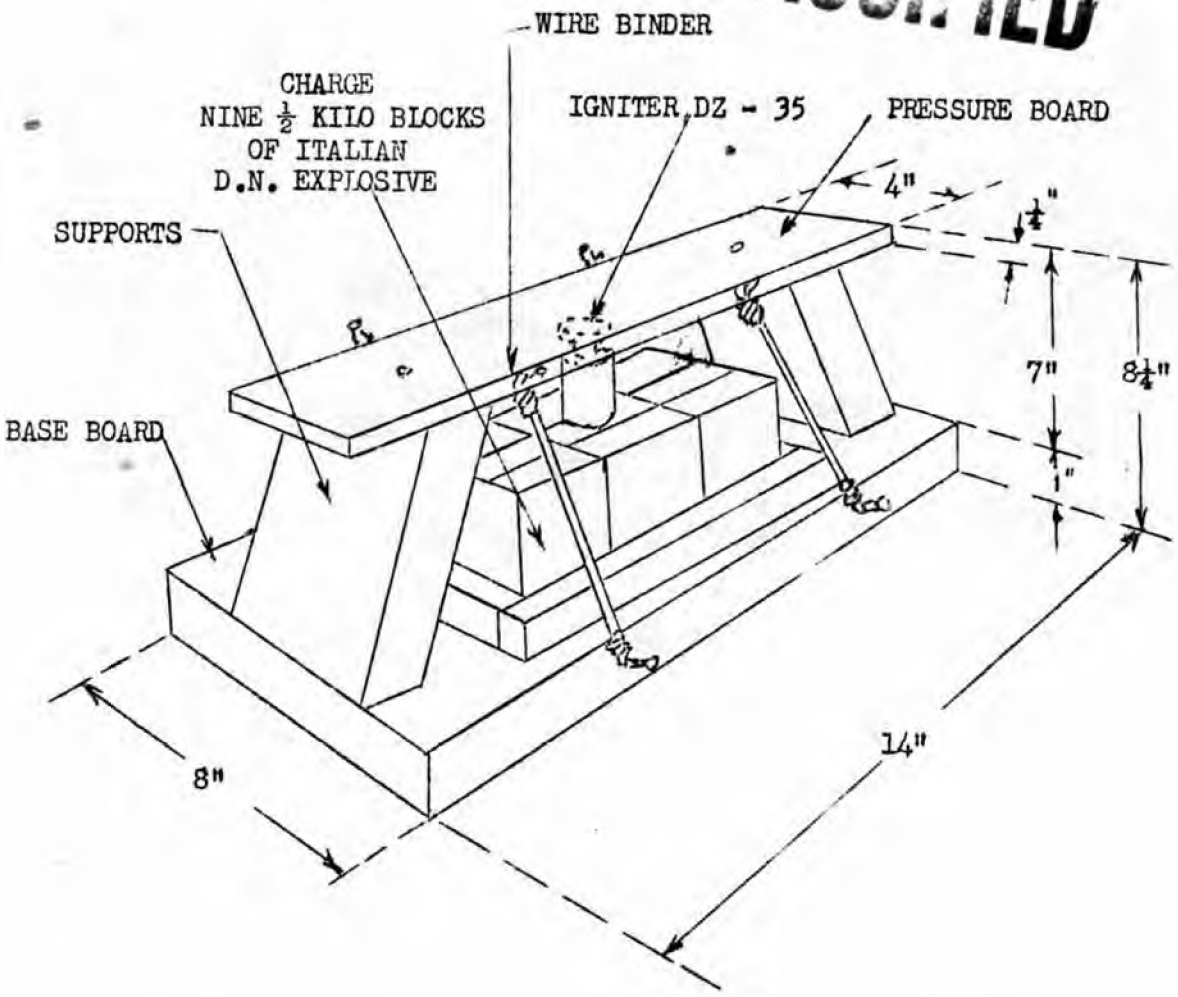
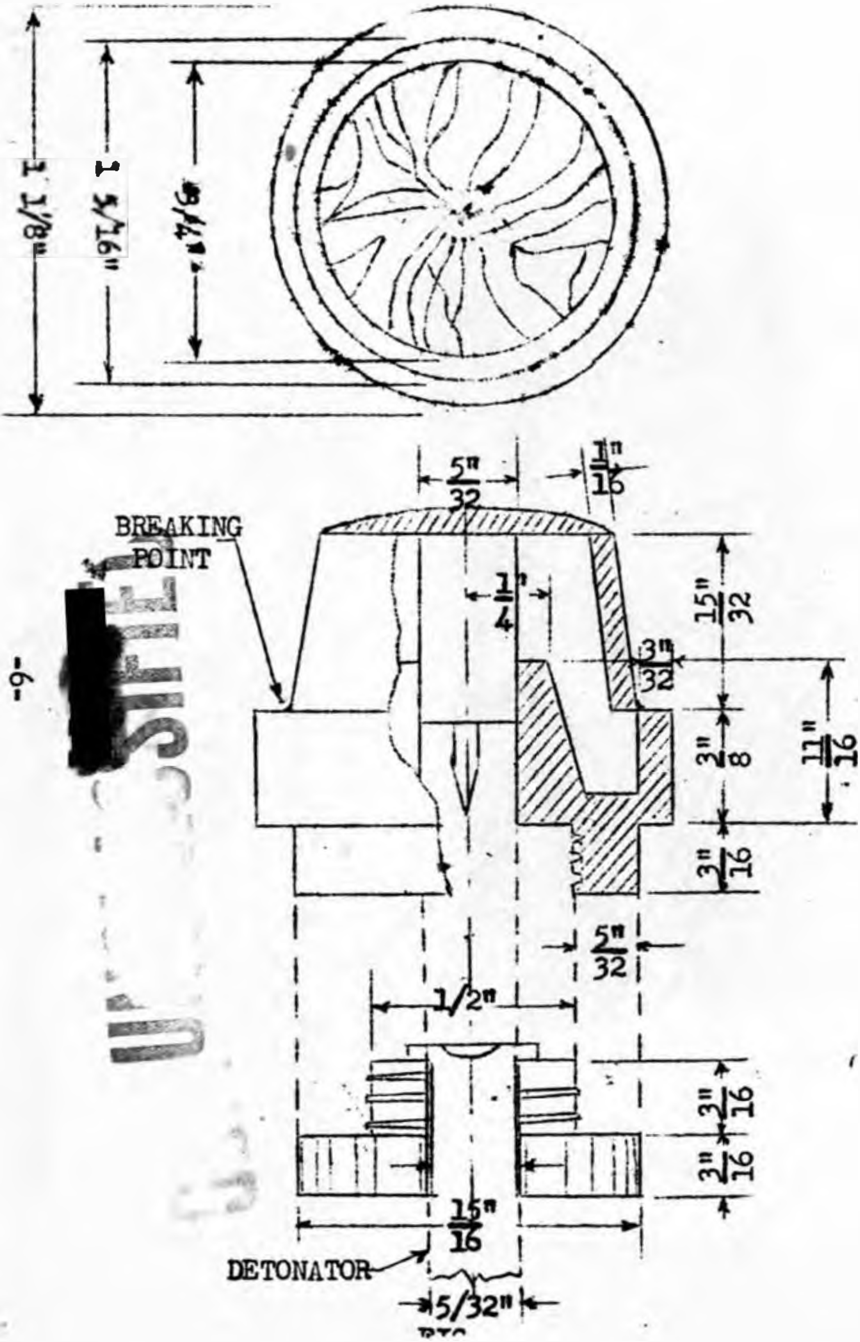


7. German Pressure Board Mine: The following sketch shows an improvised pressure board mine which was found by a unit of IV Corps, and which is similar to the "Druckbrettmine" shown in standard German Engineer Field Manuals.



8. Italian Anti-Personnel Bakelite Igniter: A considerable number of these igniters have been found in the IV Corps sector, the 16th Armd. Engineer Bn. being the first unit to report finding them. The igniter (fig. A) is probably the same as the one reported found in SICILY, and used with an improvised plastic mine (see pg 98-99, of the AFHQ pamphlet, "Mines, Minefields and Booby Traps"). The igniter is bakelite and consists of a striker pin set in an inverted cup, which is attached to an outer sleeve by a thin ring of bakelite. A slight foot pressure on the striker cup is sufficient to break the bakelite ring, allowing the pin to pierce the percussion cap. Although the igniter has been found, in ITALY, used mostly with ½ pound blocks of cylindrical Italian T.N.T. (fig. B), it can be used with any standard German or Italian explosive.

[redacted]


1 1/8"
1 3/16"
3/4"
5"/32
1"/16
BREAKING POINT
1"/4
15"/32
3"/32
3"/8
11"/16
3"/16
5"/32
1/2"
3"/16
3"/16
15"/16
DETONATOR
5/32"

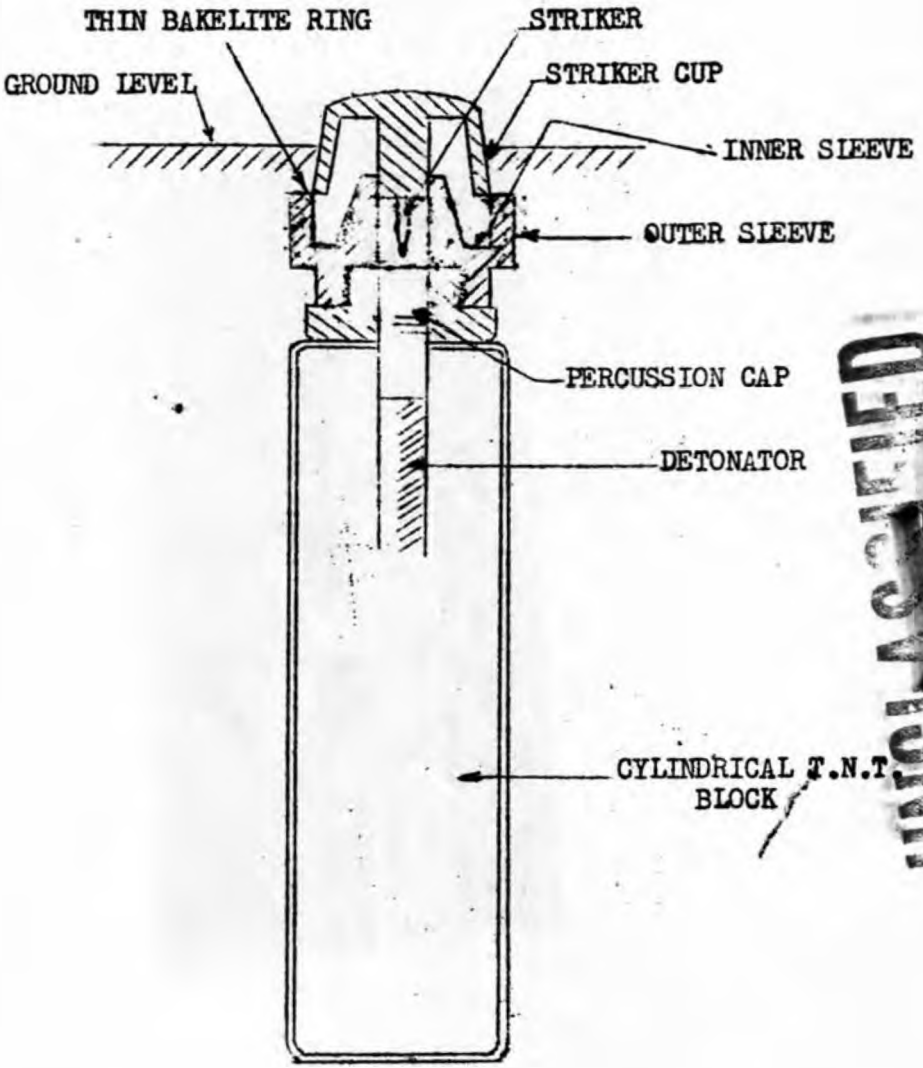


FIG. B

9. German R Mine 43: Reference Fifth Army Engineer Technical Bulletin No. 21, para I, 5, Fifth Army units are encountering these mines in ever increasing numbers. (They are also being reported found in NORMANDY.) The French Corps reports finding a considerable number of booby-trapped R mines, and in almost every case, ZZ 42 igniters have been used for this.

10. Anti-Personnel Glass Mine 43: This mine has been mentioned by various sources but, to date, it has not been encountered in Italy. The glass container is in the form of an inverted truncated cone 4.7 ins. in height with a diameter at the top of 4.7 ins. and at the base of 7.1 ins. The charge is reported to be 200 grams. The mine is actuated by a chemical crush igniter. Very little metal is incorporated in the mine and igniter. (Source: Chief Engineer, AAI)

11. Enemy Minefield - Air Photo Interpretation:

a. The following page shows two stereo pairs of an enemy minefield located on the south bank of the SERCHIO River at Q225932. Normally, minefields can only be picked up on air photos immediately after the field is laid--weathering soon obliterates the spoil. This particular field, however, was still plainly evident 20 days after it was first picked up, probably because it had not rained much in the interval.

b. The minefield is sited at (it appears so from air photos) a suitable ford site across the SERCHIO. It is 16 yds. wide, and 290 yds. long (and it may continue on under the trees). The field has a regular pattern, with 4 rows. The round and oblong shaped spoils indicate a mixture of teller, wooden box and R mines.

12. German Improvised Anti-tank Mine: A new improvised anti-tank mine was found by the 16th Armd. Engr. Bn. on a road in the vicinity of CASOLE D'ELSA. The mine consisted of two Faustpatrone projectiles with T.Mi.Z. 42 igniters replacing the percussion caps of the grenades. The grenades' detonators were left in place. The two projectiles were placed below the road surface, approximately two feet apart. A pressure board was laid across the heads of the igniters and flush with the road surface.

13. German Improvised Anti-personnel Mine: The 339th Infantry Regt. reports finding an anti-personnel mine improvised from a 105 mm shell. The shell fuse was removed, and a ZZ 42 igniter, with detonator, was cemented on the shell nose. The shell was buried at a 45° angle, with the igniter sticking above the ground, and a trip wire attached. No further details are available, as the mine was destroyed in place.

[redacted]

ENEMY MINEFIELD AT 0225932 ON
SOUTH BANK OF SERCHIO RIVER

13 June 1944

3 July 1944

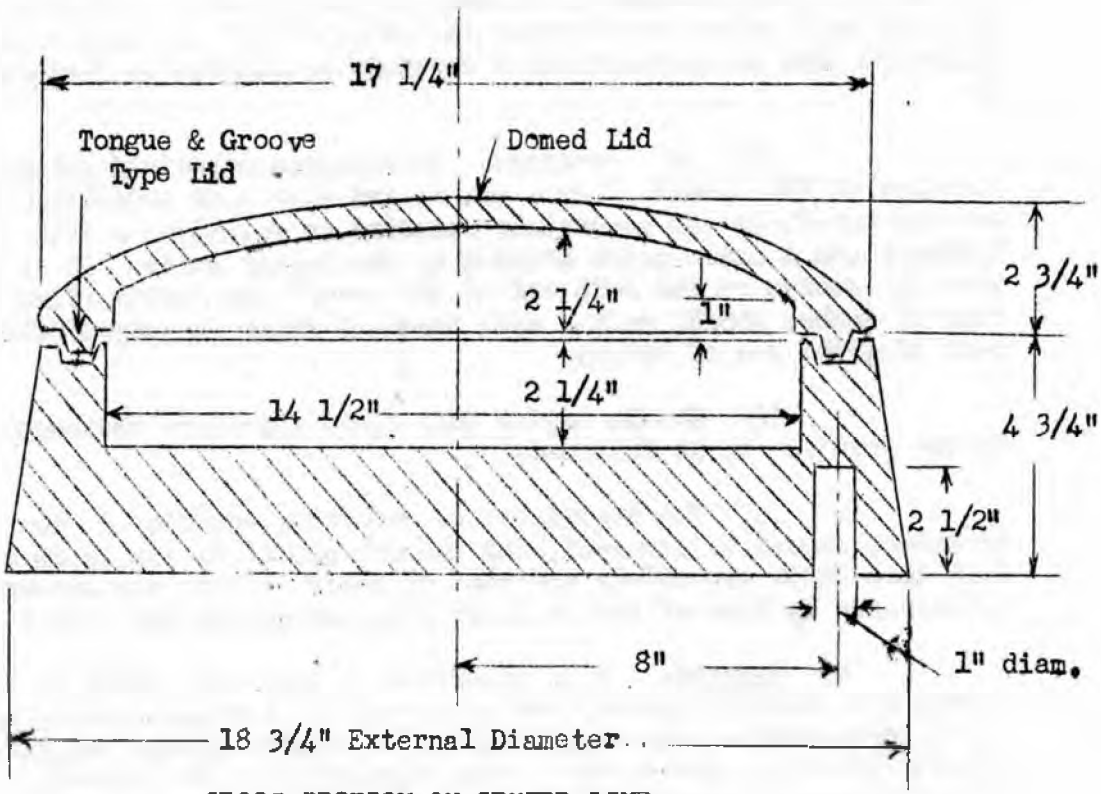
[redacted]

14. Earthenware Case for Tellermine. (Source: Second British Army Engineer Intelligence Reports No. 13 and 15, dated 23 and 25 June 1944.)

a. A visit to a brickworks revealed that 30,000 earthenware pots with lids (see sketch below) had been ordered by the Germans. These pots are sufficiently large to encase a Tellermine and the manager was told they were to be for mines. The manager further stated that only 2000 had been manufactured prior to the British arrival and to the best of his knowledge his plant was the only one manufacturing the items.

b. It is considered probable that the pots were a form of waterproof jacket for use in minefields in marshy ground or on beaches. They might also be used in roads since the jacket top is an excellent base for the application of the original road surfacing material.

c. Similar designs using concrete to serve the same purpose have been published by the Germans.



CROSS SECTION ON CENTER LINE
1/4 FULL SIZE

15. Suggested AP Minefield Pattern:

a. General: Due to the accidents encountered by various organizations in laying, removing and passing through friendly AP minefields, the 48th Engineer Combat Bn. has developed a new AP minefield pattern (see attached sketch). The trip wires are so arranged that it would be virtually impossible for enemy personnel to walk very far into the field without tripping a wire.

b. AP Minefields:

(1) As can be seen from the sketch, both M2 and M3 AP mines have been used and certain mines, selected at random, have been fitted with release firing devices. All mines are laid 25 yards apart and each one has attached to it a single trip wire 28 yards long.

(2) The detail laying the field should be broken up into the usual parties, each with a task, such as taping, sketching, carrying, burying, stake driving, etc. One specialist should be delegated the single duty of finally arming the mines, including the stringing of the trip wires. The sketch clearly shows the point of entry for this specialist and his path through the field. If this route is strictly adhered to, this man will never have to cross the trip wire of an armed mine. It is suggested that in large fields a separate specialist be assigned to each row.

(3) In accordance with accepted minefield practice, the location of the minefield as a whole, and also each individual mine, must be very carefully and accurately recorded in relation to both a fixed landmark and a datum point erected by the laying party. It is emphasized that the stakes at the left end of the second and fourth (from enemy) rows of stakes should mark a side boundary which is perpendicular to the rear (fourth) row of stakes.

(4) Troops laying this field should be thoroughly drilled in the routine to be followed.

(5) The importance of carefully adhering to the prescribed procedure should be stressed, and the men should be impressed with the fact that their own safety and that of their fellows depends upon the maintenance by them of strict discipline throughout the operation.

c. Summary: An AP minefield of this type could be laid, marked and recorded quickly and accurately by a small marking party. An easily discernable path could readily be marked through the field for passing friendly patrols due to the regularity of the pattern. Possible disadvantages of this field are that it is laid in a regular pattern; if it were discovered, the entire field could be easily removed. The field is also limited by terrain. Long trip wires could not be used on mountain sides, and rocky terrain would limit the laying of a minefield of this type. It is merely suggested as a quick method of laying a protective AP minefield that could be cleared readily.

[redacted]

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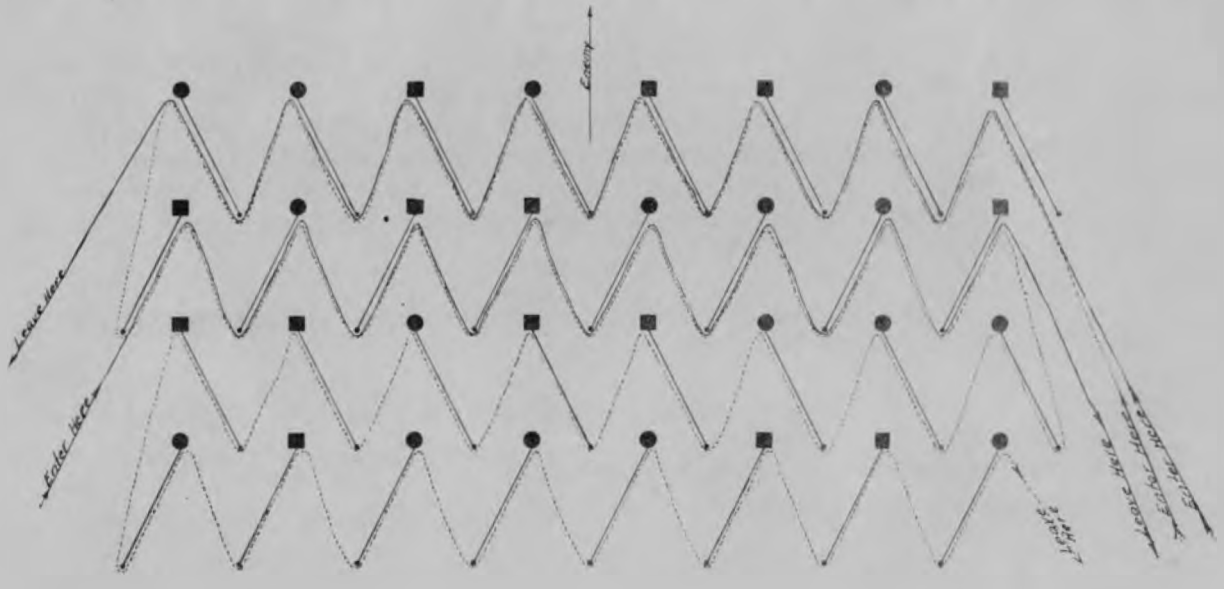
SKETCH OF FIELD

KEY: Trip Wire, Mine, Stake

2 = M2 Anti-personnel mine
3 = M3 Anti-personnel mine
3 - M3 Anti-personnel mine with release firing device
2 = M2 Anti-personnel mine with release firing device
All mines are twenty five (25) yards apart with only one (1) trip wire twenty eight (28) yards long

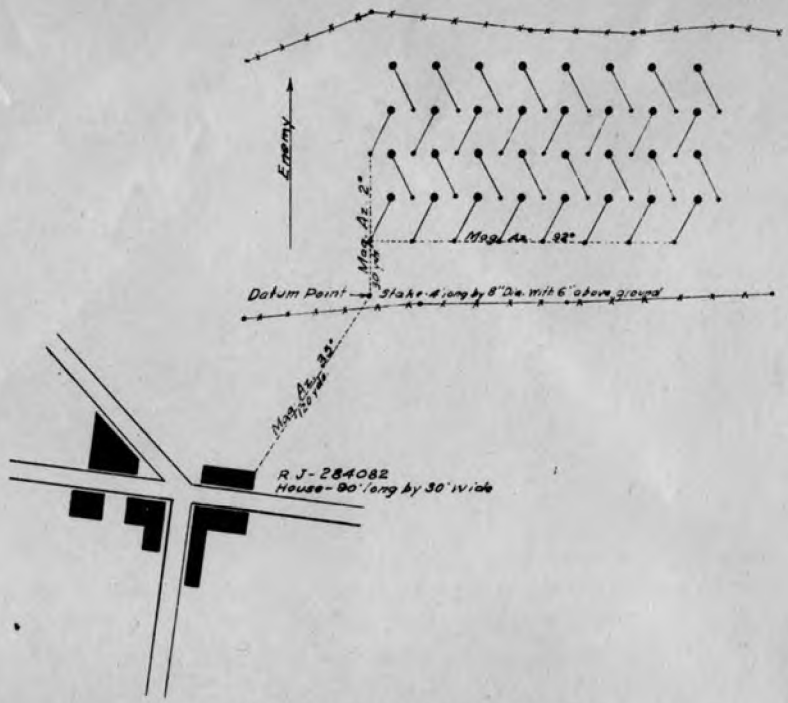


Suggestion for laying field -
Lay field with parties as in deliberate field, such as, taping, burying, sketching, stake driving and carring parties
Have one specialist who activates all mines including both mouse traps and the stringing of trip wires. If field is to large use more specialist and have each one work only one row

KEY: Path of one specialist ·····
Path of more than one ——

48 ENGR. C BN.
METHOD OF LAYING AN ANTI-PERSONNEL MINEFIELD
Scale 1 = 20 yds · Date 18th June 1944. Drawn by Pfc J.H.M. Corrected by
APPROVED BY LT COL D E. SWIFT

PRINTED BY ENGINEER, FIFTH ARMY



RECORD OF MINEFIELD

Method of recording field:
(1) Measure actual distance in yards from landmark to datum point.
(2) Record magnetic azimuth from landmark to datum point.
(3) Always have datum point behind first row of wire.
(4) Always put datum point so as to have it in line with stakes on outside of rows one and three.
(5) Measure distance from datum point to first stake in yards.
(6) Get magnetic azimuth of datum point and outside stakes of rows one and three.
(7) Record magnetic azimuth of stakes in row four or last row from enemy.

48 ENGR. C BN.

METHOD OF RECORDING AN ANTI-PERSONNEL MINEFIELD

Scale 1" = 60 yds. - Date 18 June 1944
Drg. by L.H.M^{c} - Checked by.

APPROVED BY: D E Swift
LT. COL. D.E. SWIFT

PRINTED BY ENGINEER, FIFTH ARMY

16. Checking for Mines in Bivouac Areas: The 48th Engineer Combat Bn. has adopted the following method for quickly checking bivouac areas for mines:

a. Men are lined up at two-pace intervals across the area. Each man prods a spot in front of him, then places his foot where he prodded, and repeats. In this way the line advances the length of the area.

b. If no one finds a mine, it may be assumed with some degree of safety that the area is mine free. If mines are found, the entire area is re-prodded every 6 inches.

17. Destruction of Trip Wires by Primacord and Rifle Grenade: Tests conducted by French Combat Engineers with the F.E.C. have contradicted the assertion made in recent AFHQ and Fifth Army Technical Bulletins that a single strand of primacord projected by a rifle grenade will cut tight trip wires. French Engineers reported:

a. With one primacord strand very few loose wires were broken and several tight wires were not cut at all, even though they were set up on hard ground covered with a very short growth of grass.

b. With two primacord strands, range was considerably reduced.

c. With two strands of German pentrite, range was about 60 yards and all loose and tight wires were cut.

II. OTHER FIELD DEFENSE WORKS

1. Field Fortifications, Friendly and Enemy: At a time when it held a defensive sector in the ANZIO beachhead, the CO, 509th Parachute Inf Bn distributed to his companies sketches of enemy field fortifications observed in the beachhead (reproduced on following page). He also laid down rules for organizing defensive positions which may well be taken to heart by engineer units. They are as follows:

a. Each Company Commander will take steps to insure that every officer and man under his command knows how to prepare a standard type of emplacement for each weapon with which his company is armed.

b. All officers and NCO's will require exact compliance with regulations concerning preparation of emplacements. Variations from standard types will be permitted only where good reason for the variation can be shown.

c. All defensive positions will be continuously improved even though the expected period of occupancy is short. The enemy may, by his actions, force us to stay on the defensive longer than we had planned.

d. Obstacles will habitually be placed in front of defensive works. These obstacles will not, by their position or shape, reveal the location of our main line of resistance.

e. Obstacles will always be covered by fire. Gaps will be left between obstacles to allow counter-attacks to be made.

f. Outposts and outguards will always protect and screen main positions.

g. The Company Commander will personally pick automatic weapons emplacements in accordance with the Battalion fire plan. Machine-guns will not, except in rare and justifiable instances, be sited to fire frontally.

h. All defensive positions will be organized in depth. This principle will apply down to and including squads.

i. Careful attention will be paid to camouflage and to camouflage discipline. The latter applies particularly to heaping of refuse near fighting positions.

j. All men in defensive positions will be oriented constantly on location of units on their flanks, direction in which enemy may be expected, positions of their platoon, company, and Battalion command posts.

III. COMMUNICATIONS (ROADS & RAILROADS)

Nothing

IV. BRIDGES (FIXED & FLOATING)

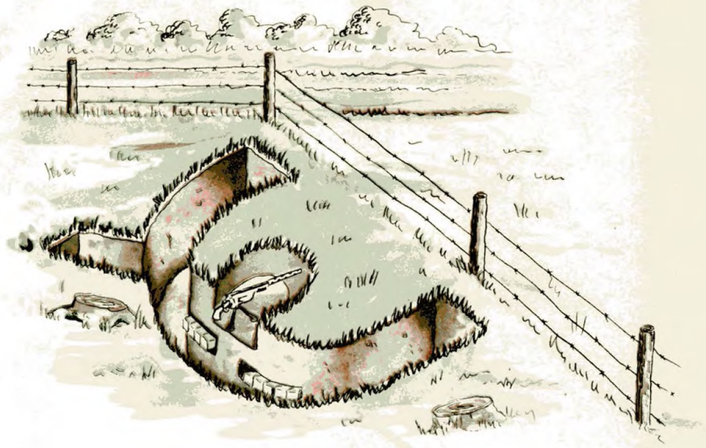
1. The "ITRI" Bridge on Route #7 at M834940: The 1st Battalion of the 337th Engineer General Service Regt. began construction on 29 May and the bridge was opened to two-way traffic on 3 June. The 92-foot gap was originally spanned with a 100-foot DD Bailey. The new bridge was constructed beneath the Bailey and except for the flooring and railings was completed before the Bailey was removed.

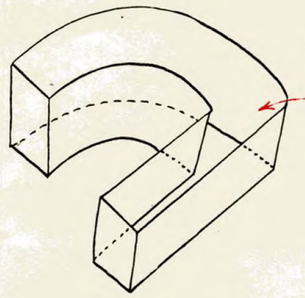
a. Type: Two-way class 40, one-way class 70, fixed type, trestle bent bridge. There are three 30' 6" spans with a total length of 91½ feet. Maximum distance from floor elevation to stream bed is 63 feet.

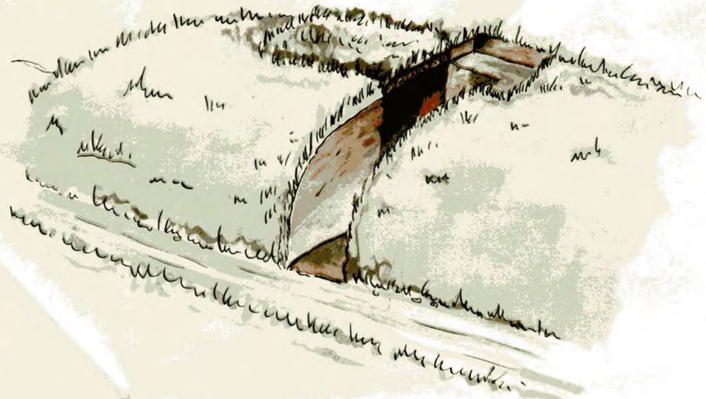
b. Bent Construction: The principal pier consists of 2 rows of 60' piles, 6 posts per row and spaced 6' apart. One 3" x 12" collar was constructed around the bent at 20' and one at 40'. Cross bracing of 3" x 12" material was bolted to the posts. Caps are 12" x 12" timbers running parallel to the center line. A 12" x 12" stringer bearing was laid perpendicular to the caps (fig. 1).

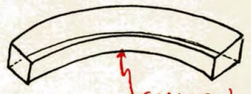
TYPES OF GERMAN FIELD FORTIFICATIONS

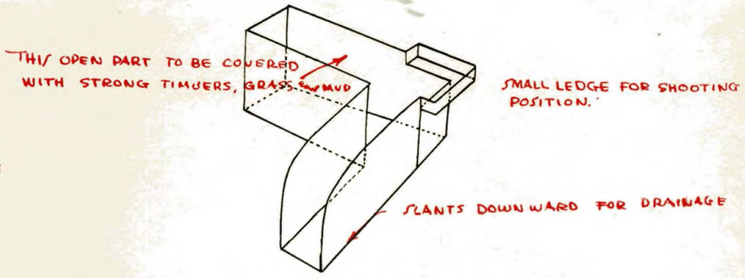
observed in ANZIO *and* NETTUNO

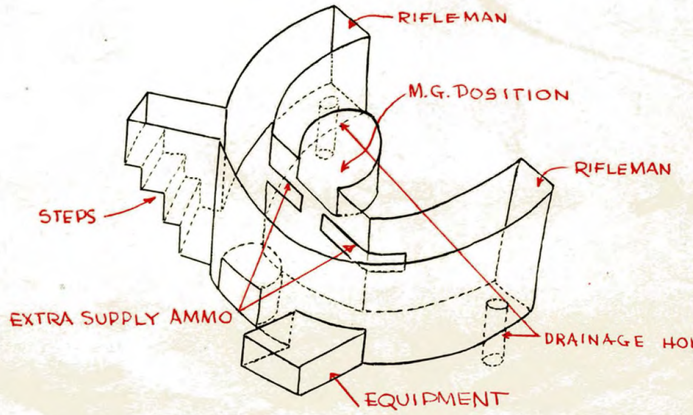


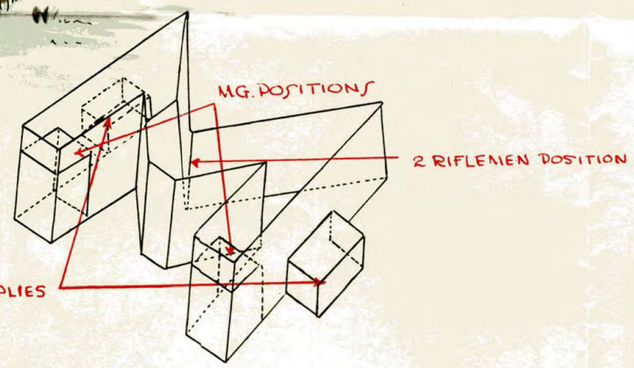


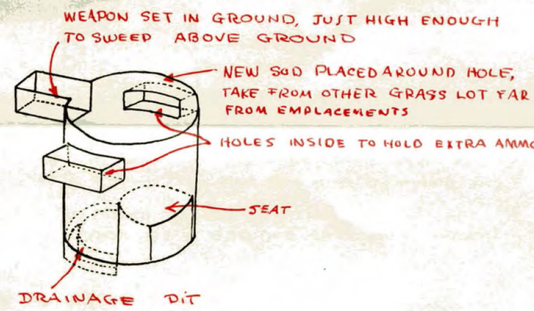












"Sketch made in the FIELD

by
SGT HERMDIECK
35126995
HQ 5th PROMT. INF BN
APO # 464, U.S. Army

c. Stringers: St[illegible]32' prefabricated girders were used, 9 per span, set on 2' 8" cent[illegible] six inch nailing strips were bolted to each stringer, usi[illegible] x 6" bolts.

d. Flooring: Two layers of 3" material were used, the lower layer laid at right angles to the center line and fastened directly to nailing strips on the stringers. The upper layer was placed parallel to the bridge.

2. Construction of the Highway Bridge on Route ' Across the GARIGLIANO River at M8C8933: Early in January, the 337th Engineer General Service Regt was instructed to prepare plans and assemble materials for constructing a semi-permanent bridge across the GARIGLIANO River below MINTURNO. The static condition of the front lines which developed shortly afterwards, delayed actual construction until 17 May. During this period, all materials were assembled, as much prefabrication as possible was accomplished and practice drills were held to test the proposed methods of launching and erection.

a. General Plan: The demolished bridge (figs. 2 & 3) was a modern, three-span, steel truss structure. The superstructure, badly twisted, had been carried slightly downstream by flood waters, and did not interfere with the proposed bridge. The south abutment was intact, as well as the approach span and first pier. The north pier (fig. 4) and the north abutment were levelled to within a few feet of the ground and were cleaned off to provide a footing for the bents. The approach roads were good with the exception of a concrete pill-box on the north end, which was removed.

b. Details of Bridge: The bridge is 228 feet long and the clear width of decking is 23 feet. There are four spans, respectively 45' 1", 65' 7¼", 65' 7¼" and 52 feet. It is rated as Class 40 for two-way traffic, or Class 70 for one-way. (It has successfully carried a Class 90 load.) The two river piers are pile bents and the land pier is a timber trestle. The undamaged south masonry pier of the original bridge forms the south abutment.

c. Construction of the Bridge:

(1) River Piers. There are two river piers, each consisting of 16 sixty-foot piles. These piles are arranged in two rows of 8 piles each and were driven to an average penetration of 18 feet. Each pile measured approximately 18" at the butt. In addition, a buffer pile was driven on the upstream side. The piles were cut off at the desired elevation and capped with 12" x 12" timbers running parallel to the center line of the bridge. A stringer seat consisting of four 12" I-beams connected with 2½" x 3" angles for cross bracing was drifted to the caps. (See figs. 5 & 6 for pictures of pile driver and river piers.)

(2) Land Pier. A standard double-bent pier constructed of 12" x 12" timbers was placed on the old pier base. The original reinforcing rods protruding from the batter were used to tie down the lower sill (fig. 7). A stringer seat similar to that on the river piers was used.

(3) Stringer System.

(a) North approach span. The stringer system for this span consists of six 72" deep x 52' long truss girders spaced on 4' x 4" centers. As with all main girders used on this bridge, they originally were part of a craneway at the demolished BAGNOLI steel plant.

(b) Main Spans. Two continuous girders, 67" deep, were used to support the main bridge over the three remaining spans (figs. 8 & 9). These were erected on the south shore and cross bracing was added prior to launching (fig. 10).

(c) Launching Girders.

1. The girders were spliced together to form a continuous structure and mounted on Bailey plain-type rollers (fig. 11).

2. Two sets of grillage consisting of 6" x 6" timber were built up to the proper height on the piers, anchored by cables and topped with standard Bailey base plates and plain rollers.

3. The connected girders were pulled across the river by two cables from separate hoisting drums of a M-25 Tank Recovery Unit. An Osgood 2-yard shovel with crane attachment was used to lift the girders and push on the near shore as the M-25 pulled.

4. The girders were launched with very little difficulty. Eighty-one hours after construction had been started the launching was completed and the truss was in position, ready for jacking down.

(d) Setting Girders.

1. Two 50-ton jacks were to be used on the abutments and on each pier for jacking the girders down. Operations had scarcely started when one jack on the upstream side at the north pier slipped, pitching the end of the superstructure into the river with the following effect: The front end was resting in the river; the back end was raised several feet in the air above its supporting grillage on the abutment; the girders were pulled halfway off the second pier, but remained fastened to the first pier; the cross bracing in the third span was crumpled, and the third span girders were bent and twisted (figs. 12, 13, 14, 15 & 16).

2. Method of Raising Girders. After an inspection it was decided to raise the whole bridge intact. All base grillage was removed from the piers and the sides of the girders were securely anchored. Two piles were driven upstream from the third pier and 10-inch channels were bolted between the piles and the piers directly under the girders (fig. 12). To raise the girders back onto the piers, every piece of available lifting equipment was used; two double blocks, with steel cable, were attached to the top of the piles and pulled by a D-7 (fig. 12); a pile driving rig assisted with hammer line (fig. 13); a 3/4 yd. shovel was attached to the nose (fig. 15); and [redacted] blocks and cables were fastened to the downstream side and pulled by D-[redacted] and R-4's. The girders were

c. Stringers: Six 32' prefabricated girders were used, 9 per span, set on 2' 8" centers. Four by six inch nailing strips were bolted to each stringer, using ½" x 6" bolts.

d. Flooring: Two layers of 3" material were used, the lower layer laid at right angles to the center line and fastened directly to nailing strips on the stringers. The upper layer was placed parallel to the bridge.

2. Construction of the Highway Bridge on Route 7 Across the GARIGLIANO River at M8C8933: Early in January, the 337th Engineer General Service Regt was instructed to prepare plans and assemble materials for constructing a semi-permanent bridge across the GARIGLIANO River below MINTURNO. The static condition of the front lines which developed shortly afterwards, delayed actual construction until 17 May. During this period, all materials were assembled, as much prefabrication as possible was accomplished and practice drills were held to test the proposed methods of launching and erection.

a. General Plan: The demolished bridge (figs. 2 & 3) was a modern, three-span, steel truss structure. The superstructure, badly twisted, had been carried slightly downstream by flood waters, and did not interfere with the proposed bridge. The south abutment was intact, as well as the approach span and first pier. The north pier (fig. 4) and the north abutment were levelled to within a few feet of the ground and were cleaned off to provide a footing for the bents. The approach roads were good with the exception of a concrete pill-box on the north end, which was removed.

b. Details of Bridge: The bridge is 228 feet long and the clear width of decking is 23 feet. There are four spans, respectively 45' 1", 65' 7¼", 65' 7¼" and 52 feet. It is rated as Class 40 for two-way traffic, or Class 70 for one-way. (It has successfully carried a Class 90 load.) The two river piers are pile bents and the land pier is a timber trestle. The undamaged south masonry pier of the original bridge forms the south abutment.

c. Construction of the Bridge:

(1) River Piers. There are two river piers, each consisting of 16 sixty-foot piles. These piles are arranged in two rows of 8 piles each and were driven to an average penetration of 18 feet. Each pile measured approximately 18" at the butt. In addition, a buffer pile was driven on the upstream side. The piles were cut off at the desired elevation and capped with 12" x 12" timbers running parallel to the center line of the bridge. A stringer seat consisting of four 12" I-beams connected with 2½" x 3" angles for cross bracing was drifted to the caps. (See figs. 5 & 6 for pictures of pile driver and river piers.)

(2) Land Pier. A standard double-bent pier constructed of 12" x 12" timbers was placed on the old pier base. The original reinforcing rods protruding from the latter were used to tie down the lower sill (fig. 7). A stringer seat similar to that on the river piers was used.

(3) Stringer System.

(a) North approach span. The stringer system for this span consists of six 7..' deep x 5..' long truss girders spaced on 4' x 4" centers. As with all main girders used on this bridge, they originally were part of a crane way at the demolished BAGNOLI steel plant.

(b) Main Spans. Two continuous girders, 67" deep, were used to support the main bridge over the three remaining spans (figs. 8 & 9). These were erected on the south shore and cross bracing was added prior to launching (fig. 10).

(c) Launching Girders.

1. The girders were spliced together to form a continuous structure and mounted on Bailey plain-type rollers (fig. 11).

2. Two sets of grillage consisting of 6" x 6" timber were built up to the proper height on the piers, anchored by cables and topped with standard Bailey base plates and plain rollers.

3. The connected girders were pulled across the river by two cables from separate hoisting drums of a M-25 Tank Recovery Unit. An Osgood 2-yard shovel with crane attachment was used to lift the girders and push on the near shore as the M-25 pulled.

4. The girders were launched with very little difficulty. Eighty-one hours after construction had been started the launching was completed and the truss was in position, ready for jacking down.

(d) Setting Girders.

1. Two 50 ton jacks were to be used on the abutments and on each pier for jacking the girders down. Operations had scarcely started when one jack on the upstream side at the north pier slipped, pitching the end of the superstructure into the river with the following effect: The front end was resting in the river; the back end was raised several feet in the air above its supporting grillage on the abutment; the girders were pulled halfway off the second pier, but remained fastened to the first pier; the cross bracing in the third span was crumpled, and the third span girders were bent and twisted (figs. 12, 13, 14, 15 & 16).

2. Method of Raising Girders. After an inspection it was decided to raise the whole bridge intact. All base grillage was removed from the piers and the sides of the girders were securely anchored. Two piles were driven upstream from the third pier and 10-inch channels were bolted between the piles and the piers directly under the girders (fig. 12). To raise the girders back onto the piers, every piece of available lifting equipment was used; two double blocks, with steel cable, were attached to the top of the pile and pulled by a D-7 (fig. 12); a pile driving rig assisted with hammer line (fig. 13); a 3/4 yd. shovel was attached to the nose (fig. 15); and 3 blocks and cables were fastened to the downstream side and pulled by D-7's and R-4's. The girders were

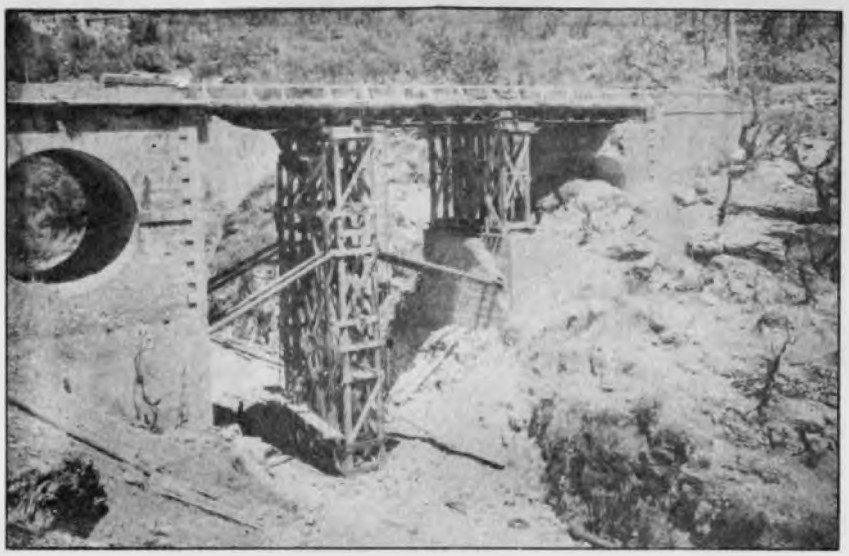


FIG. 1
ITRI BRIDGE

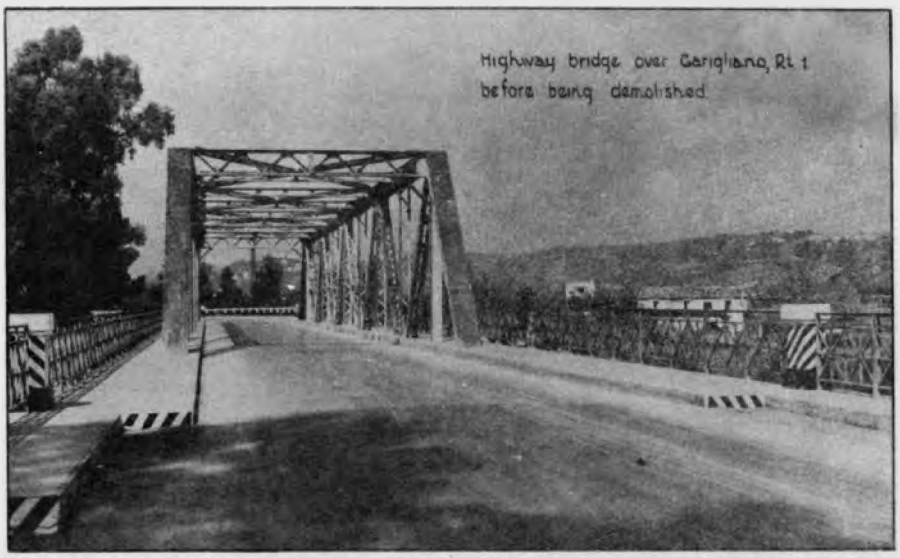


FIG. 2

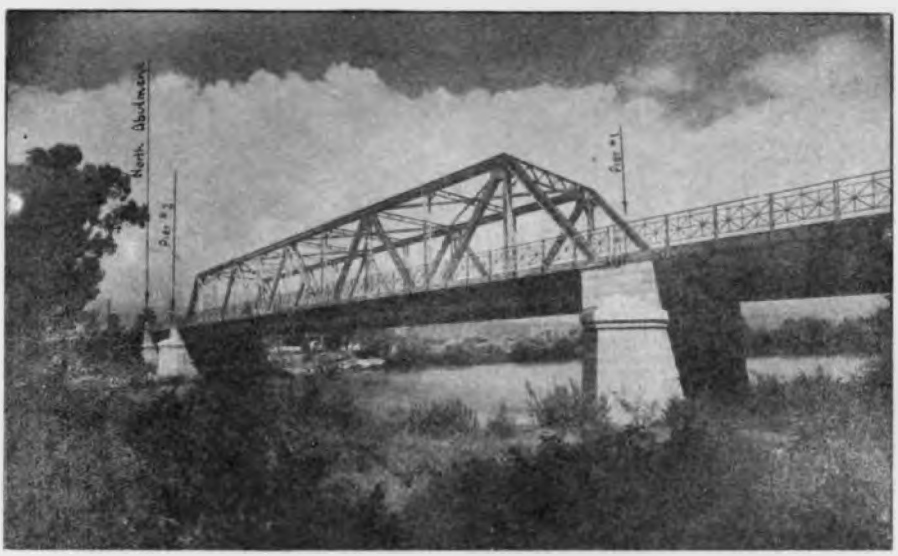


FIG. 3

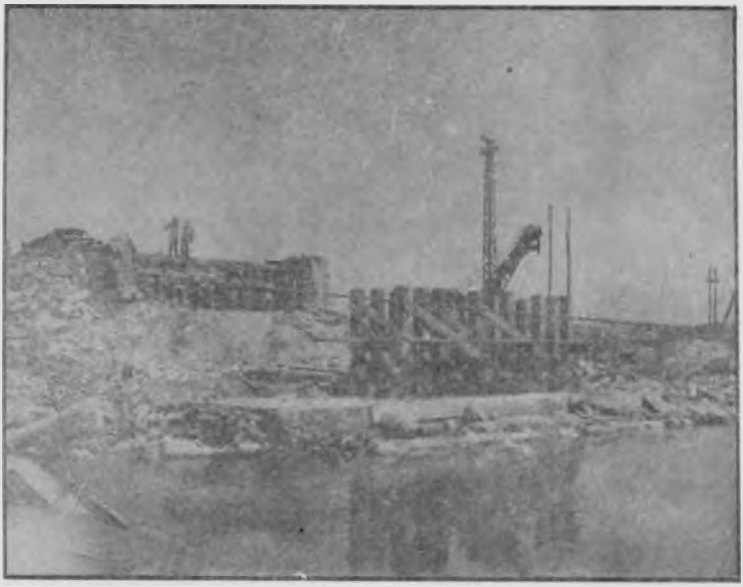


FIG. 4

FIG. 6

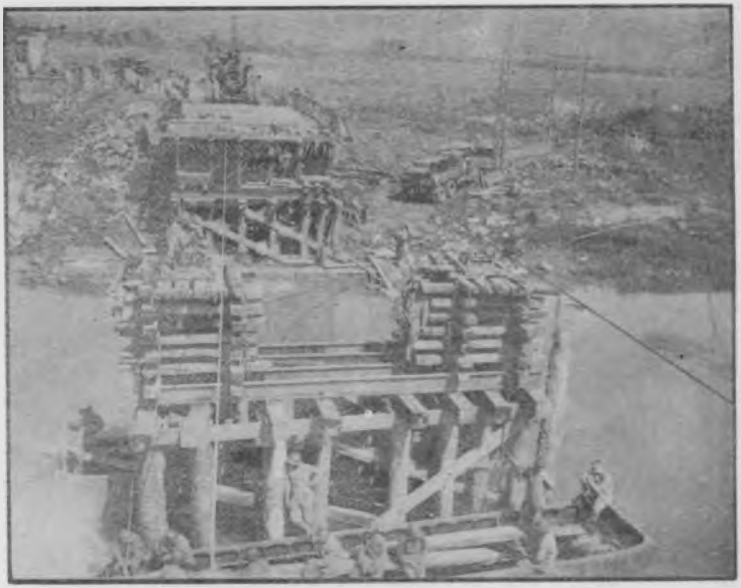


FIG. 5

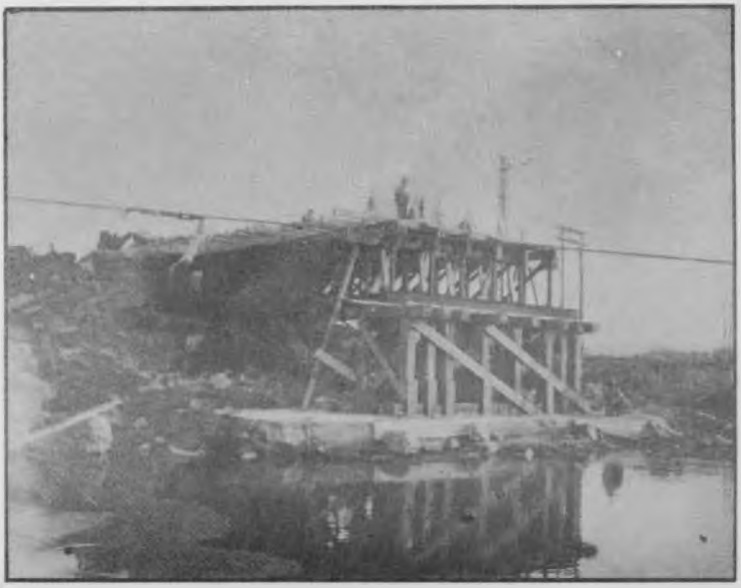


FIG. 7

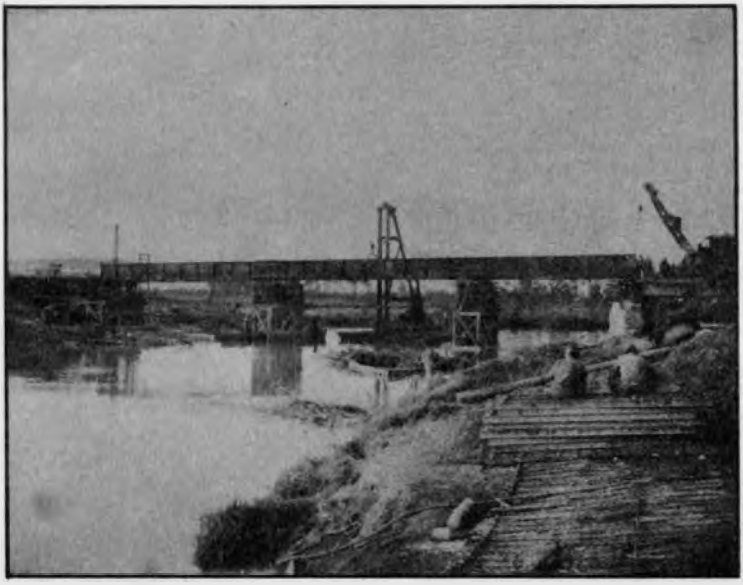


FIG. 8

FIG. 10

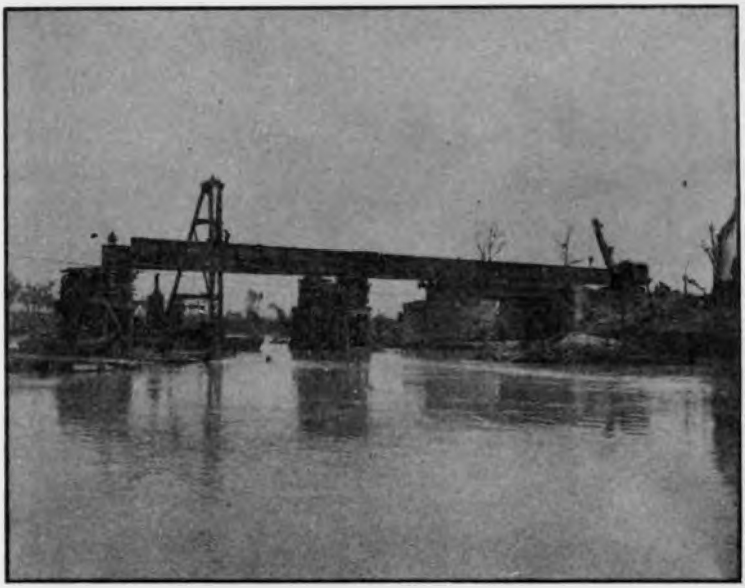


FIG. 9

FIG. 11

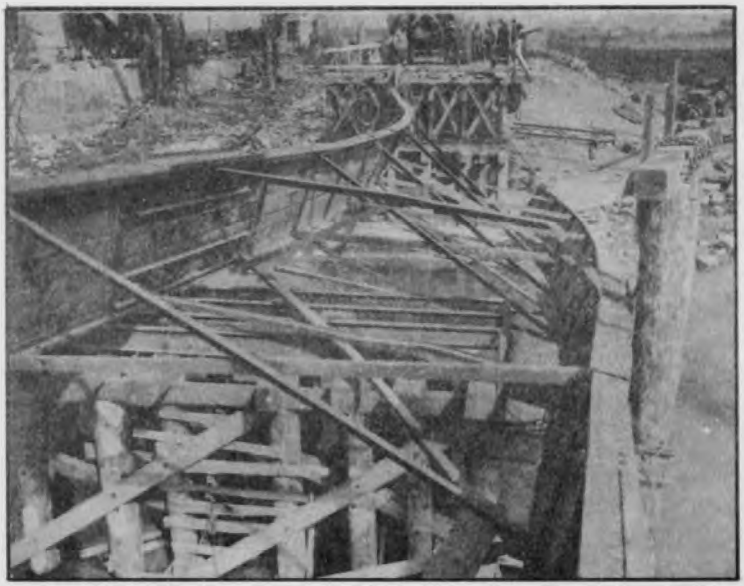


FIG. 12

FIG. 14

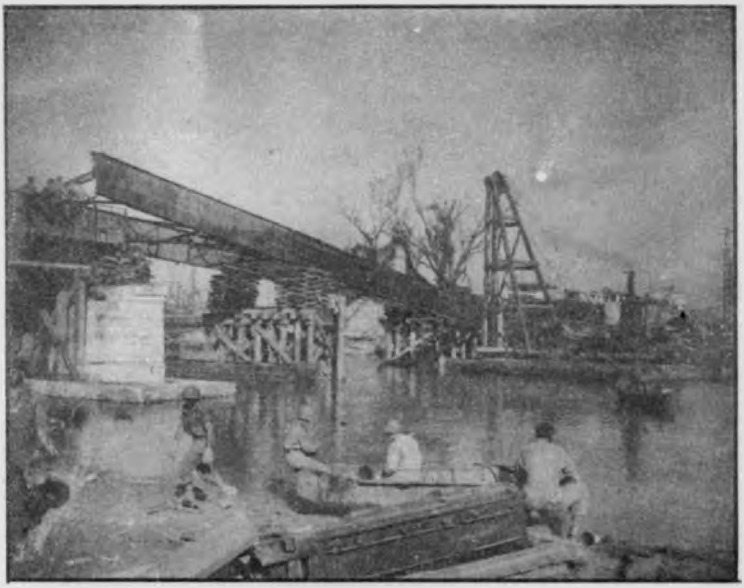


FIG. 13

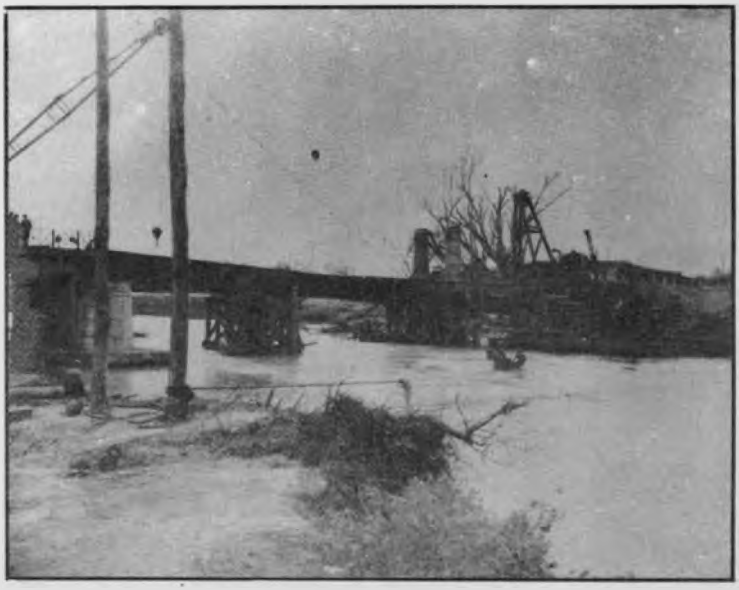


FIG. 15

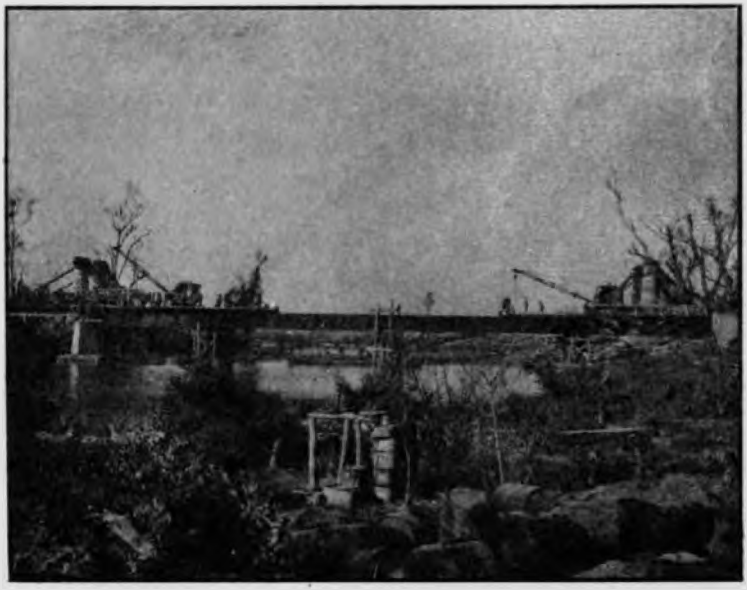


FIG. 16

FIG. 18

FIG. 17

FIG. 19

raised sufficiently to permit placing of 12" x 12" timbers between them and the piers. They were then slid into their correct position on the pier, where the necessary straightening was done and additional cross bracing added. The time lost due to the accident amounted to approximately 48 hours.

(4) Floor System.

(a) The flooring consisted of 2 layers of 3-inch material, the lower layer running parallel with the center line of the bridge and the upper layer perpendicular to it.

(b) The floor was carried on 12-inch I-beams or channels, set across the girders on 30-inch centers and fitted with 4" x 4" nailing strips.

(c) Standard 6" x 6" wheel rub blocks and hand rails completed the decking system (figs. 17, 18, 19).

d. Time: The work order to construct was received at 1515 hours, 17 May, and the bridge was opened for traffic at 1800 hours, 23 May, a total of 148 hours and 45 minutes. The man hours totalled 42,650 and were distributed as follows:

(1)	Construction of bridge and approaches	19,810
(2)	Erection and operation of ponton raft for the pile driving rig.	1,440
(3)	Operation and prefabrication of material prior to construction order	15,400
(4)	Operating heavy equipment and hauling material to bridge site	6,000

3. Improvised Footbridge: Drawing of an improvised footbridge constructed by the 111th Engineer Combat Bn appears in the sketch on the next page. No further details are available but on the basis of the submitted sketch the Army Engineer states the following:

"At least a 1-ton load could be concentrated at the center of the 60-foot span if the bridge is constructed according to the specifications set forth."

4. Damage to Bailey Bridge Floats: In the removal of the two floating Bailey bridges across the ALBEGNA River on Highway #1 near ORBETELLO, 31 floating units were found to be damaged. The following summary of damaged units and causes for the damage is published for the guidance of all concerned in avoiding such waste in the future.

a. Two floats damaged by crane operator in removal from trucks.

b. One float damaged when it fell off of truck.

c. Three floats damaged while bridge was being built.

d. Thirteen floats damaged either by normal use or by timber and logs in river. These were temporarily repaired at the site.

e. Twelve floats damaged in removal from river by setting floats on rocks on the shore, by bumping them together or by crane handling.

5. Use of Bailey Crib Piers to Support Partially Demolished Span: Incomplete demolition of the reinforced concrete highway bridge on Route #1 at E679420 resulted in only 1 span being completely demolished (fig. 20).

a. In order to repair the bridge and release the Bailey installed over it, a plan for replacing the demolished section with a revetted fill was approved. It was also decided to support the central span with Bailey cribs. Little or no current in the stream was to be expected.

b. Cribs were arranged with a double layer of 3-inch lumber used as a foundation mattress (fig.21). The assembly was floated to the correct position, where it was sunk by releasing the floats. A timber cap was used as a footing for 50-ton hydraulic jacks, which easily raised the sagging section of the bridge (fig. 22).

c. Suitable timber caps were then installed (fig. 23), and the Bailey removed.

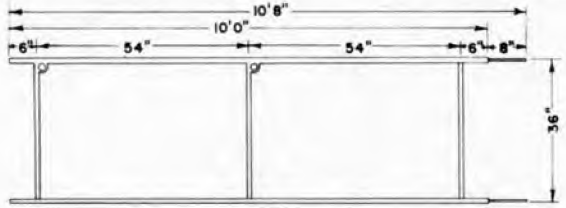
d. The work was done by Company F, 343rd Engineers. One-way traffic was maintained throughout construction, except for the two hours necessary to remove the Bailey.

6. Widening Existing One-Way Bridge: A one-way German military bridge on Route #1 near CIVITAVECCHIA was widened to take two-way traffic by the 92nd Engineer General Service Regiment.

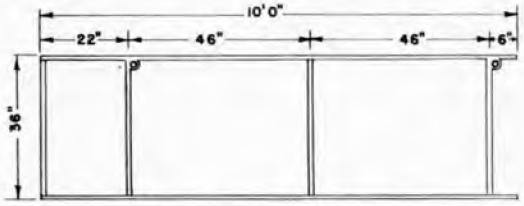
a. A truss with two supporting sills was erected at one end of the main span, to seat both a Bailey Panel Truss and a prefabricated girder (fig. 24). Additional bents were then erected on 30-foot centers to the North abutment. Standard Fifth Army type prefabricated girders were used on the 30-foot spans and two 60-foot Bailey girders, one on each side, were placed across the main span. The entire bridge was then refloored and guard rails installed. One-way traffic was maintained throughout construction (figs. 25, 26, 27).

V. WATER SUPPLY

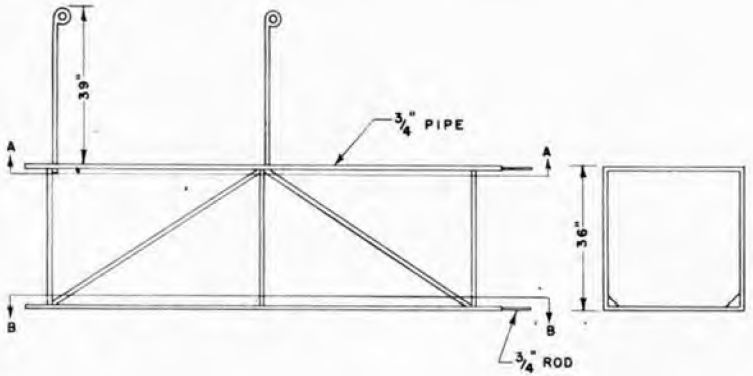
Nothing

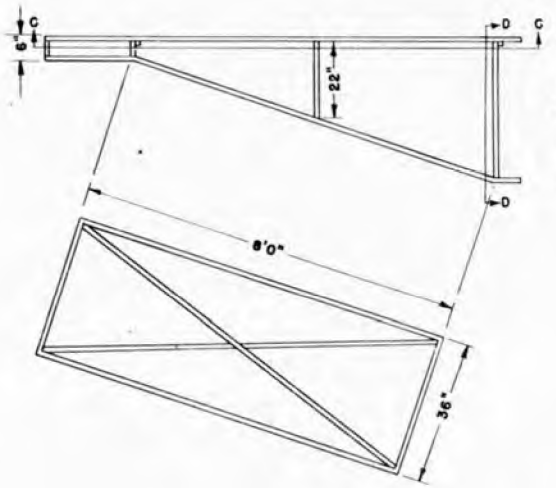


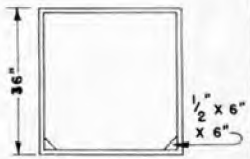
SECTION A-A



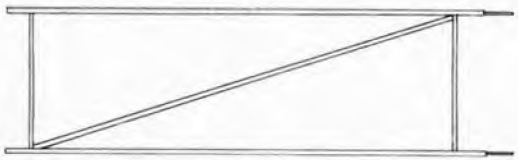
SECTION C-C



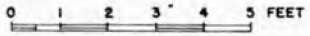


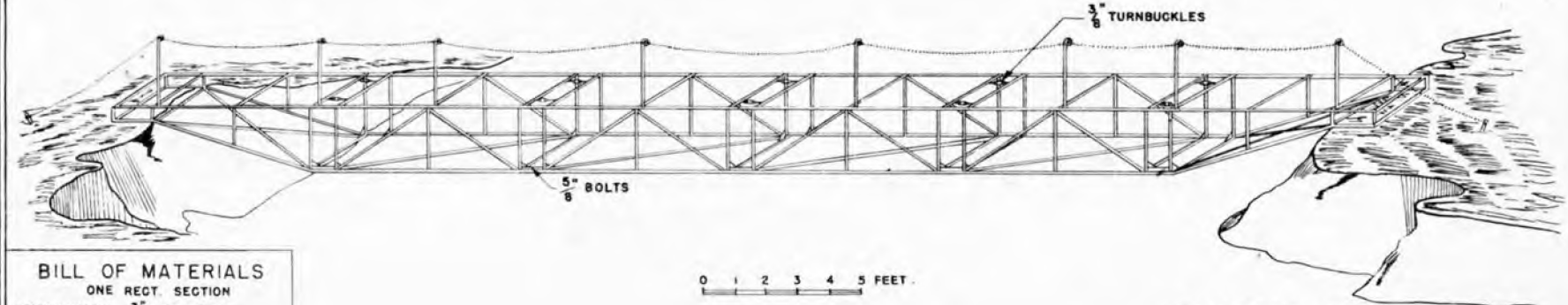


SECTION D-D



SECTION B-B





BILL OF MATERIALS

ONE RECT. SECTION

92'0" (LINEAR) 3/4" PIPE, IRON

36'0" " 1 1/2" ROD

2 - 3/8" TURNBUCKLES

2 - 5/8" BOLTS

4 - 6" GUSSETS

DECKING - 1 BAILEY BRIDGE CATWALK

ALL JOINTS WELDED

FOOTBRIDGE

CAPACITY 1400 LBS. FOR 60 FT. LENGTH

DESIGN & CONSTRUCTION

111th. ENGINEER. C BN.

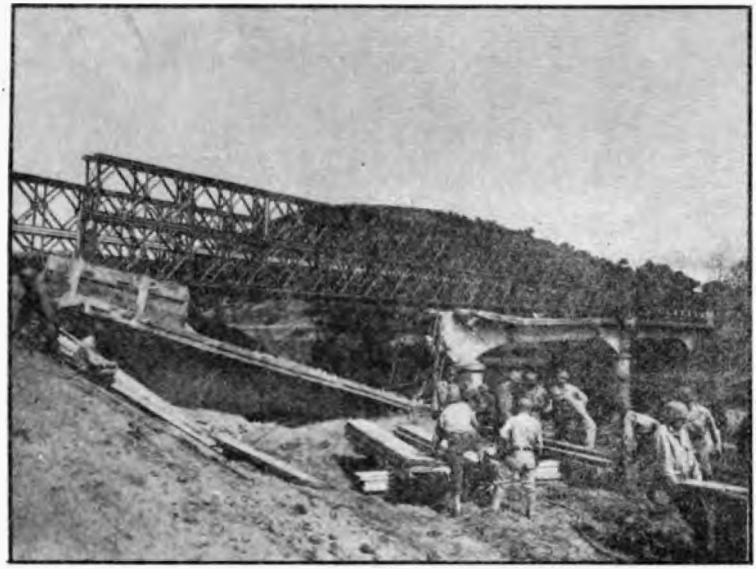


FIG. 20.
130' D/D BAILEY BRIDGE

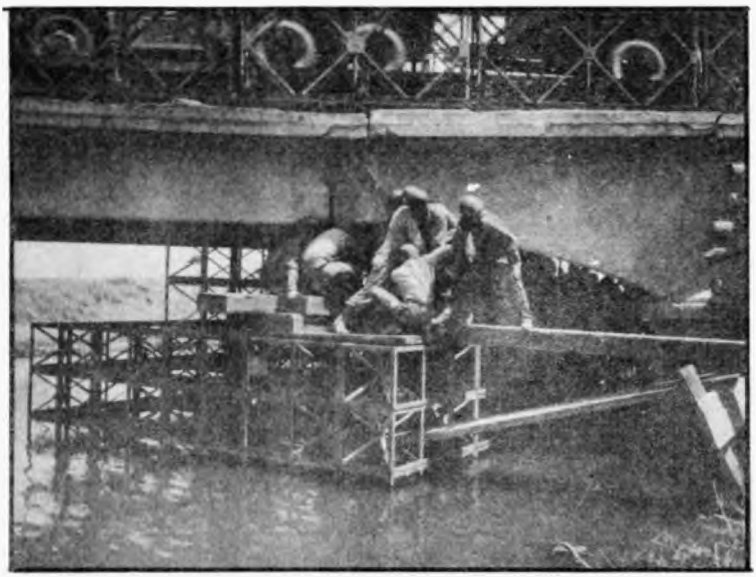


FIG. 22.
INSTALLING CRIB PIER

BRIDGE ON ROUTE NO. 1.

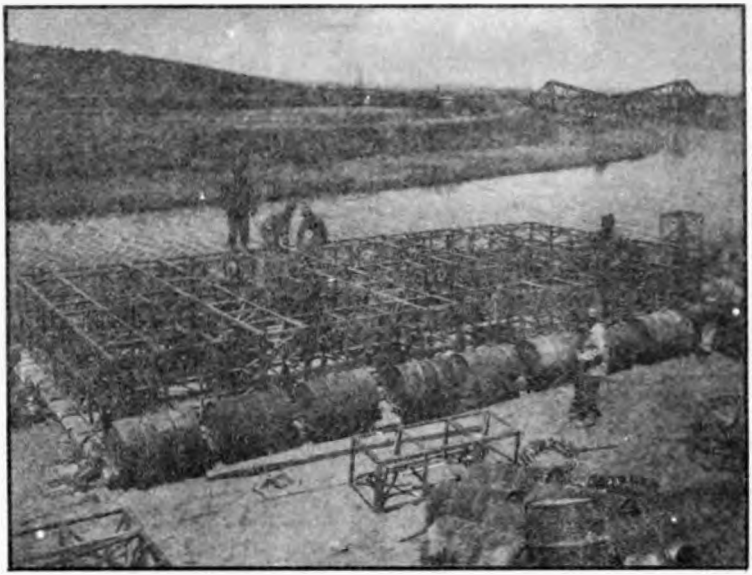


FIG. 21.
PREPAIRING BAILEY CRIB PIER

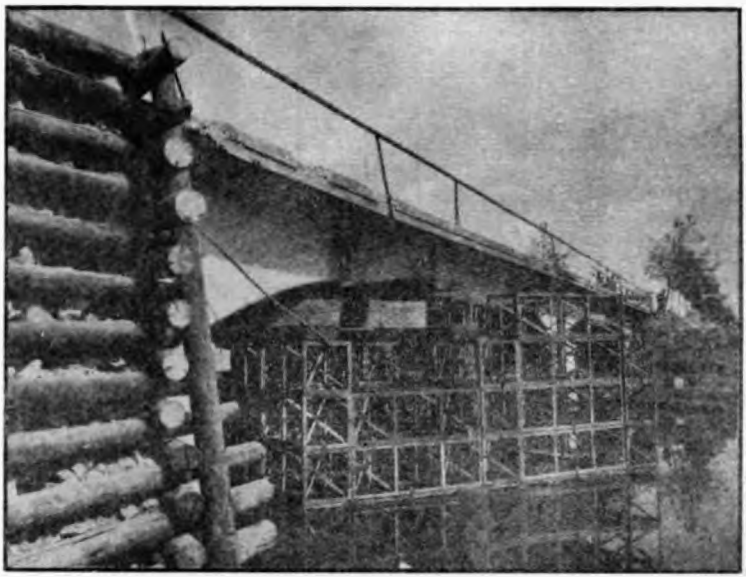


FIG. 23.
DETAIL OF CRIB PIER

WIDENING BRIDGE NEAR CIVITAVECCHIA

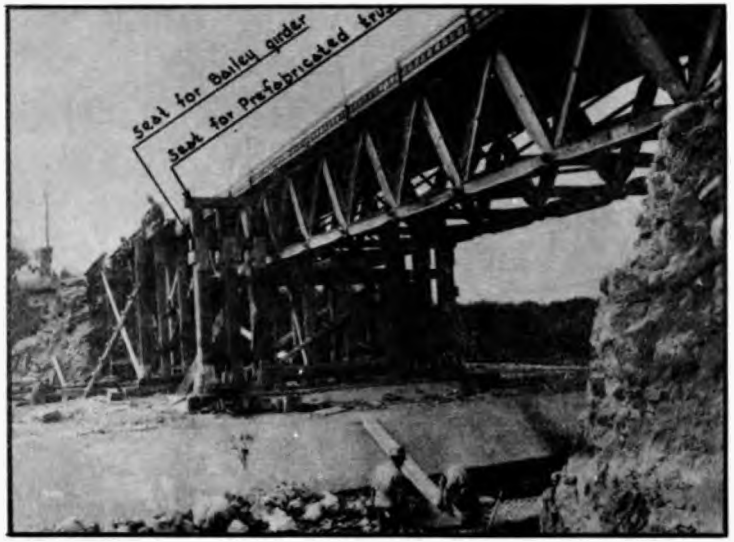


FIG. 24

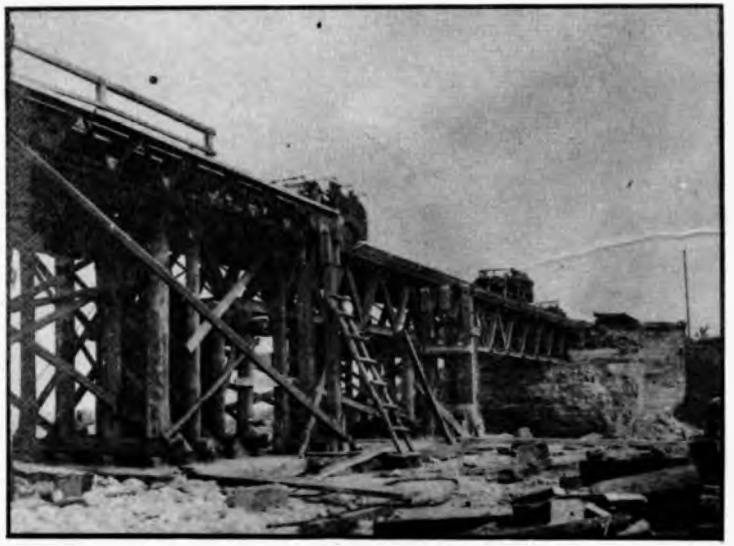


FIG. 25

FIG. 26

FIG. 27

PRINTED BY ENGINEER, FIFTH ARMY

VI. CAMOUFLAGE
Nothing

VII. GENERAL CONSTRUCTION
Nothing

VIII. ENGINEER SUPPLY

IA. EQUIPMENT

1. D-6 Tractor Clearance Figures: As D-6 Tractors are replacing the D-4 Tractors in Division Combat Bns., the following clearance figures are furnished:

D-6 w/A6 blade (Tiltdozer)	101" wide 181.9" long w/o winch 213.5" long w/winch
D-6 w/A66R Blade	105.25" wide 183.0" long
D-6 w/SK6 Blade Angled	115.0" wide 248.5" long 216.0" long w/o winch but w/blade angled.

2. In connection with the above dimensions the following clearances are also of interest.

Bailey Bridge
129" between curbs (ribands)
148" between trusses

LCM 3	Ramp is 115" wide
LCT 2	Ramp is 144" wide
LCT 3	Ramp is 144" wide
LCT 4	Ramp is 156" wide
LCT 5	Ramp is 148" wide
LCT 6	Ramp is 148" wide

X. PUBLICATIONS

1. Below is a list of recent acquisitions to the Engineer Headquarters Library. These documents are available on a loan basis to all engineer units for a period not to exceed five days. Only one copy of each is available and prompt return of borrowed documents is necessary in order that all interested parties may benefit from available information. Requests for items should be accompanied by the document title, number and/or date.

a. ENGINEER BOARD REPORTS	Date
No. 828 Water Tank, Skid-mounted, 700 gallon	13 June 1944
No. 833 Radio Detonators	27 June 1944

b. TECHNICAL

	Date
TM 9-736 Mine Exploder, T1E1	25 May 1944
TME 11-227 German Radio Communication Equipment	June 1944
Amphibious Operations - during the period August to December 1943 (U.S. Fleet)	
Etousa Handbook on Enemy Engineer Equipment (in 3 vols)	8 June 1944
Mechanical Methods of Clearing Minefields	15 May 1944

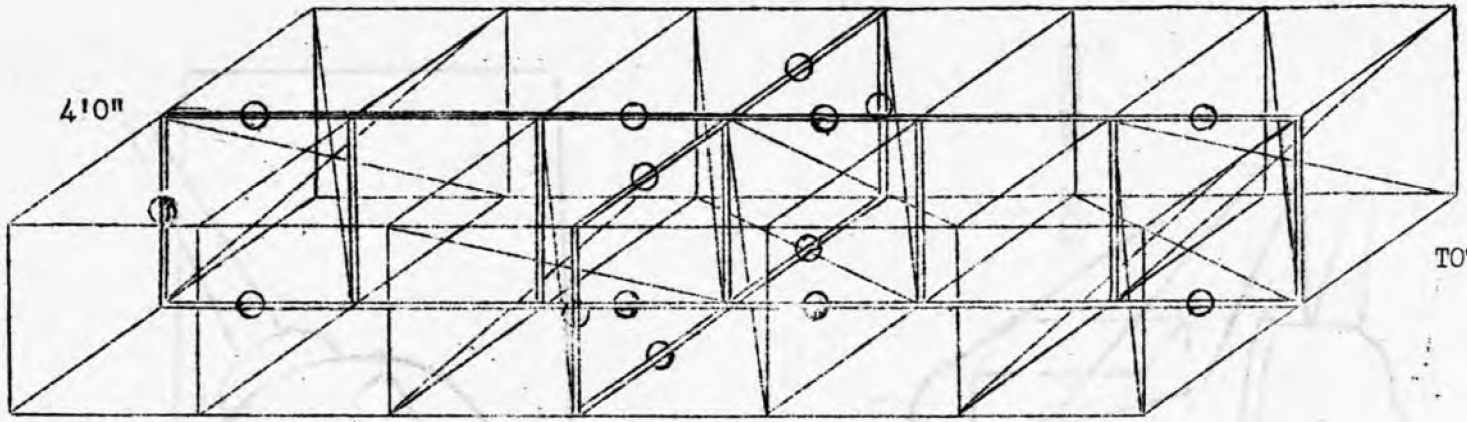
XI. MISCELLANEOUS

1. Steel Cube Tank Stepping Stone: The following description of the steel cube tank stepping stone has been extracted from Eighth Army Intelligence Summary No. 7, dated 22 June, 1944. The device has proved very effective in getting limited numbers of medium and light tanks across steep-sided streams, 8 - 15 feet wide and up to 6 feet deep.

a. Design: The design finally adopted is a steel cube stepping stone, 12' x 4" x 2', made up by clamping together 4 reinforced standard (British) steel bridging cubes. Details showing reinforcement required and method of clamping are shown on Sketch A. Stores required -- 4 Steel Cubes, 16 Clamps. The reinforcement is provided by welding to the steel cube sections of standard 3-foot Sommerfeld Track pickets. The total weight of the Stepping Stone is 900 - 1,000 lbs.

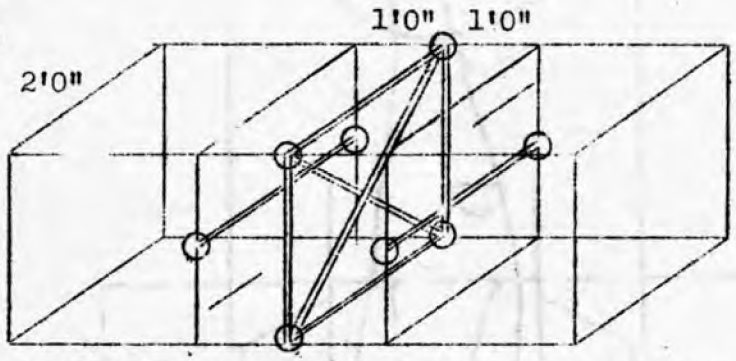
b. Method of Loading on the M-4 Tank: Details of loading are shown on Sketch B, and details of quick release attachments on Sketch C. It has been found that, having removed the siren and the forward flimsy portions of the track guards and having withdrawn the hull machine-gun the Stepping Stone can easily be loaded and rides securely on the front of the tank in the position shown in the drawing. One-inch cable slings and shackles (White Scout Car tow-ropes are suitable) are secured to the towing lugs on the front of the tank. The slings are passed over the cube Stepping Stone and secured to a quick release attachment in the turret. The quick release can be attached by means of a lashing to the gun mounting. The gun must be traversed to point toward the rear, but not directly to the rear or the radio aerial is fouled by the slings when released. The angle of the turret is therefore adjusted so that the aerial is clear of the slings. One Engineer platoon (1 NCO and 11 EM) is required to load the Stepping Stone on to the tank. The Stepping Stone can be loaded and secured to a M-4 tank by a trained party in approximately 5 minutes.

c. Launching and Positioning: It has been found most suitable to provide an Engineer detail (1 NCO and 5 EM) with 3 picks and 3 shovels to assist in clearing the obstacle and positioning the Stepping Stone

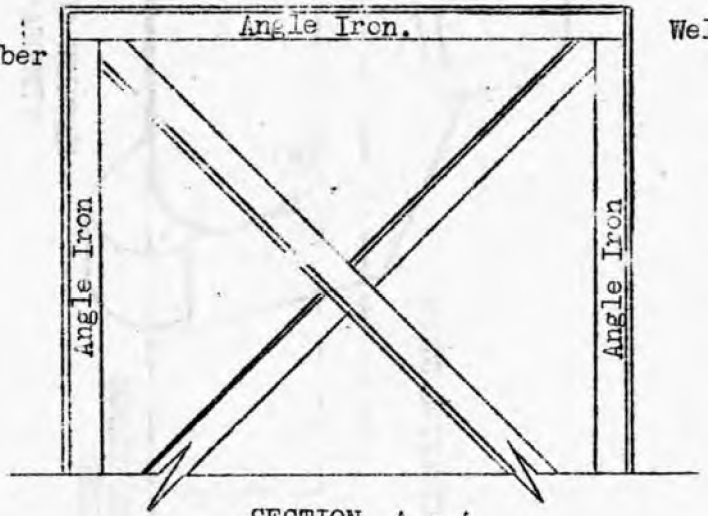


TOTAL: 16 CLAMPS

SKETCH SHOWING CLAMP POSITIONS OF TANK STEPPING STONE SCAIE: 1/2" to 1' 0"



REINFORCEMENT OF STEEL CUBE FOR TANK STEPPING STONE. WEIDS SHOWN RINGED.

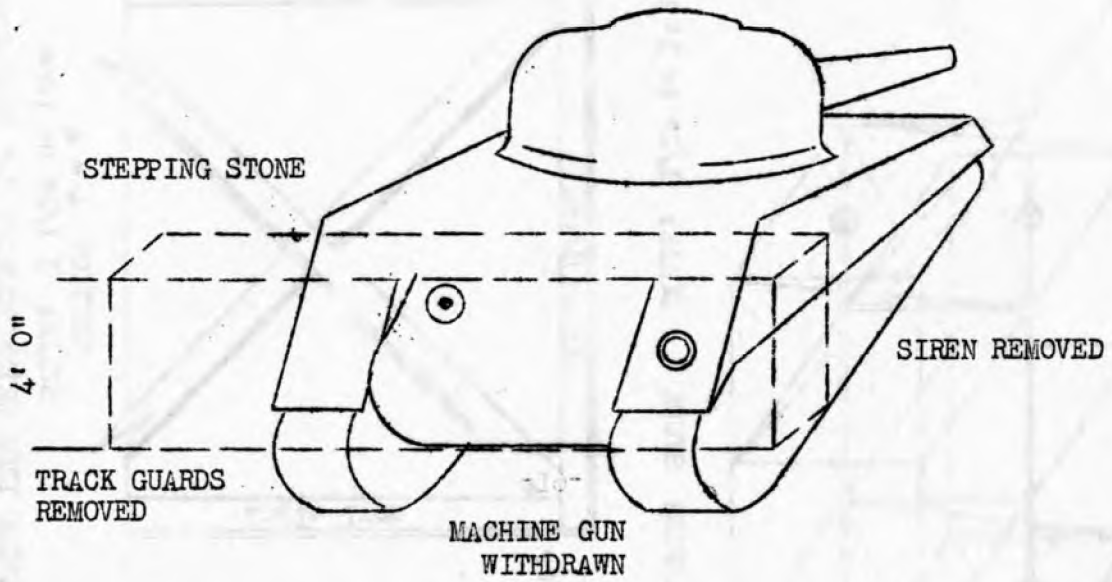


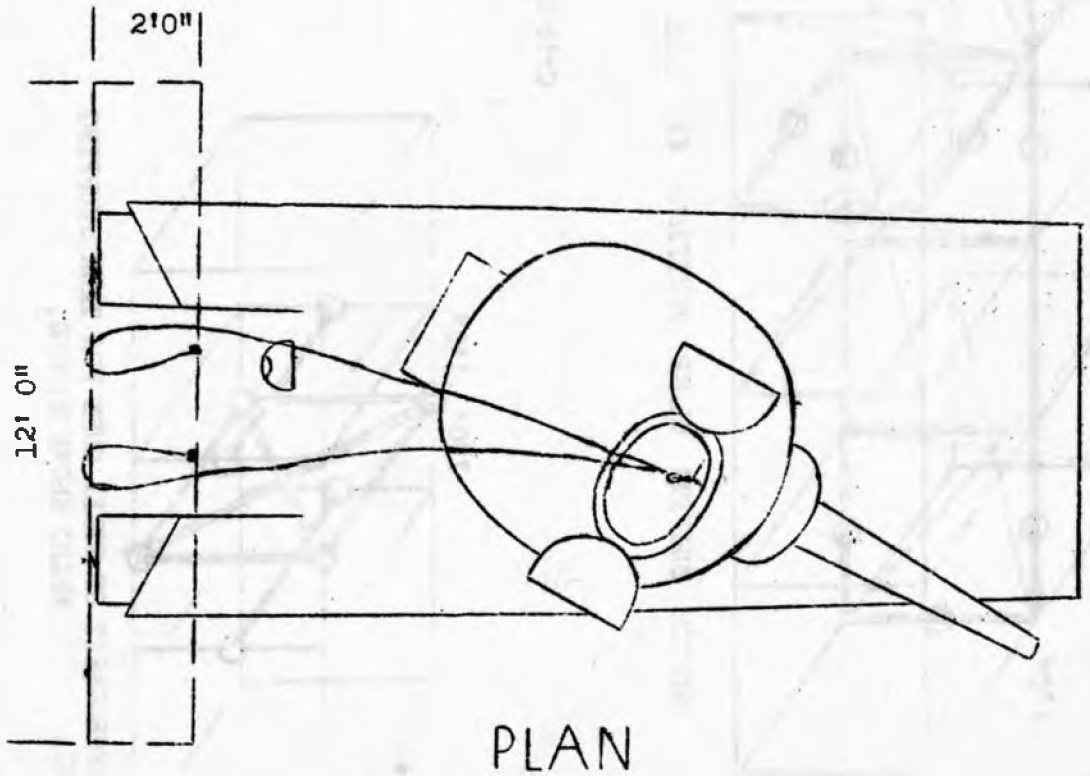
SECTION A - A
SCAIE: 1 1/2" to 1'0"

ANGIE IRON REINFORCEMENT CUT FROM SOMMERFEID TRACK PICKETS 3'0" (1 1/2" x 1 1/2" x 1/4" SECTION)

SKETCH 1A

SKETCH SHOWING METHOD OF CARRYING STEEL CUBE STEPPING STONE ON SHERMAN TANK

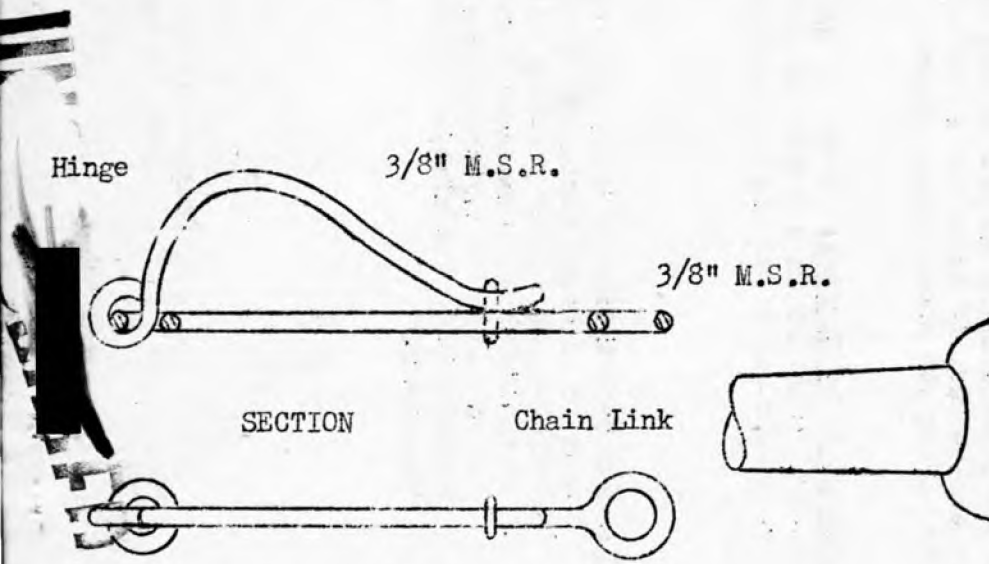




PLAN

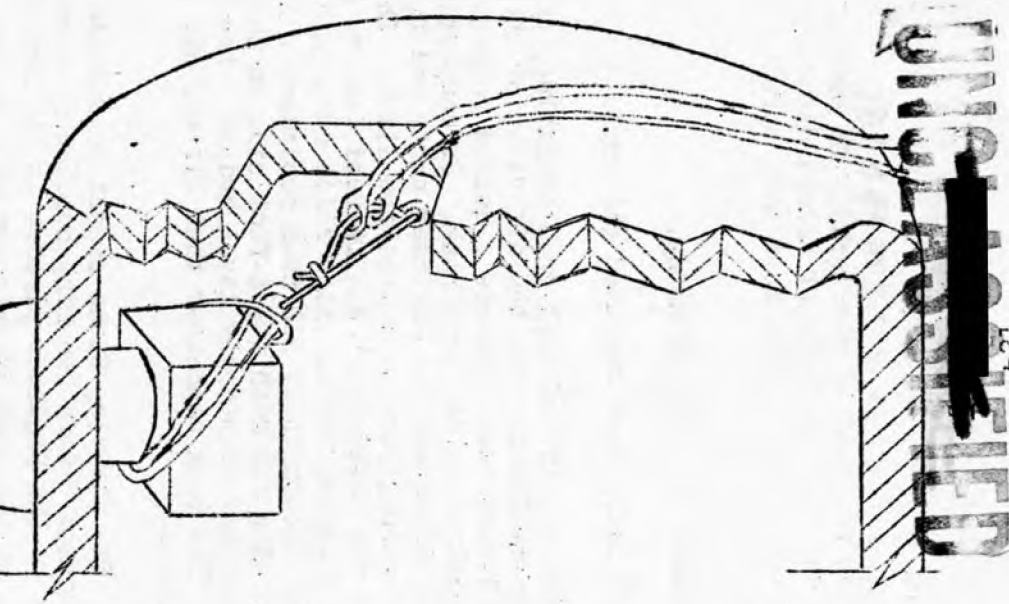
SKETCH B

SKETCH SHOWING QUICK RELEASE FOR



SKETCH

CABLE TO TANK STEPPING STONE



SECTION THROUGH TURRET

H C

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(this party to travel on the back of the tank). On arrival at the obstacle the tank commander and the Engineer detail dismount. The tank commander, in consultation with the Engineer NCO, carries out a quick reconnaissance and decides:

(1) Best site for the crossing.

(2) Preliminary work required (if any).

The Engineer party; with two of the tank crew assisting, carries out any preliminary excavations required under the direction of the tank commander. The far bank of a 5 - 6 foot deep obstacle required ramping, but normally very little work is required on the home bank. On completion, tools are stacked clear of the crossing and the Engineer party and tank crew (four on each side of the crossing) jump down into the ditch. The tank commander directs his tank up to the obstacle. When in position, he orders the gunner to release the Stepping Stone, which rolls down into the ditch. The working party under the Engineer NCO then positions the Stepping Stone square to the tank crossing and with the 4-foot side on the ground. It must be placed on a firm and reasonably level bed well towards the far bank of the obstacle. The tank commander then directs his tank and following tanks over the crossing.

d. General: The Stepping Stone cannot be expected to stand up to more than 12 - 20 crossings before becoming hopelessly distorted and broken. The remainder of the Engineer platoon in the Scout Car should, if possible, follow up to the tank crossing to pick up the Engineer detail. The Scout Car should carry explosives, if these are found to be required for breaking down the banks. Pick and shovel work, however, is all that is normally required.

e. Scale of Equipment to be Carried: Owing to their bulk, not more than 3 Stepping Stones can be loaded in a 3-ton truck, but slings, lashings, quick release attachments and a few white marking pickets and sleepers can also be carried.

NOTE: Any description of only enemy equipment or methods, contained in this bulletin, or in any previous edition of the Fifth Army Engineer Technical Bulletin, may be extracted and reproduced with the classification of "RESTRICTED".

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