[redacted]

UNCLASSIFIED

[redacted]

:By Authority of:
: CG, Comd Hq :
: 5 Army Engrs :
:Initials ____ :
:Date 5 ____ :

COMMAND HQ FIFTH ARMY ENGINEERS
2626th Engineer Group (Prov)
APO 464 US ARMY

N [redacted] 5019

5 April 1945

Classification changed to UNCLASSIFIED
by authority of [redacted] WDGS
by E. S. JOHNSTON
Colonel, Infantry

SEP 10 1945

ENGINEER TECHNICAL BULLETIN NO. 29

INDEX

JUN 21 1965

I. MINES, BOOBY TRAPS, AND DEMOLITIONS

1. New Large Type Schumine (Source: EIN No. 3, Third Army):

a. General: This new type Schumine has been encountered in the vicinity of KIRF (VQ-0900065) in considerable quantity. In several instances the mines have been found without igniters and charges. In addition the mine had been described by a P/W four days prior to the time they were found. The mines are used for the same purpose as the regular Schumine. The firing pressure varies from 10 to 30 pounds depending on the strength of the shear nail. The mine is primarily anti-personnel but will disable vehicles. Details of the mine are shown on the following page.

b. Description: This type Schumine employs the ZZ42 igniter and two Sprengkorper 28's. The pressure block, attached to the lid, presses the activating pin from the ZZ42 igniter. The igniter is held in place by the igniter securing block. In order to increase the firing pressure a small nail must be bent before the pressure block will touch the activating pin of the igniter. A heavy pin is used as a safety pin. The lid is hinged in the same way as a regular Schumine.

c. Operation: One Sprengkorper 28 is placed in the rear portion of the bottom box. The ZZ42 igniter is then inserted through the igniter securing block into the other Sprengkorper and laid in place in the mine box. The lid is then closed and the mine buried and camouflaged.

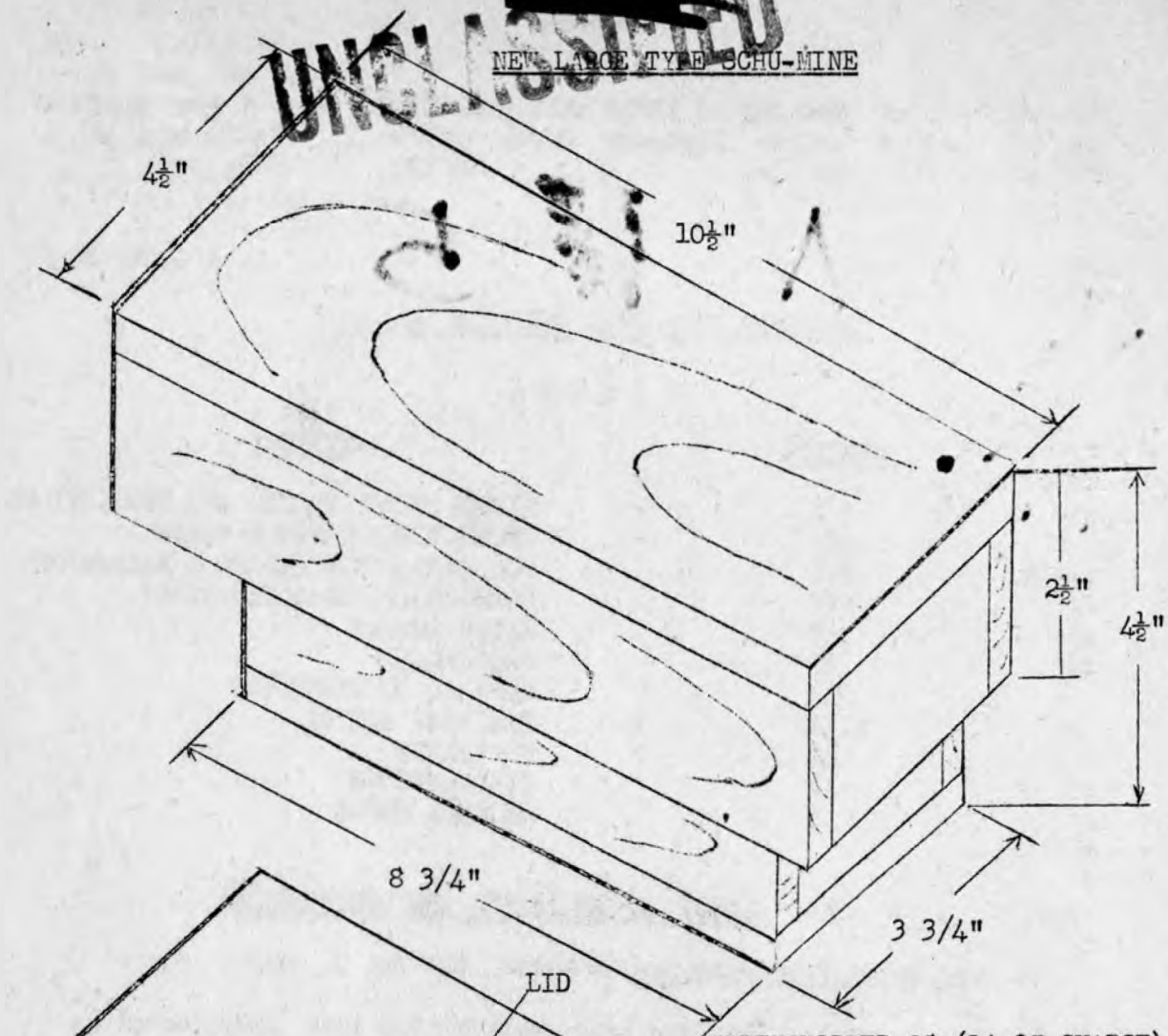
UNCLASSIFIED

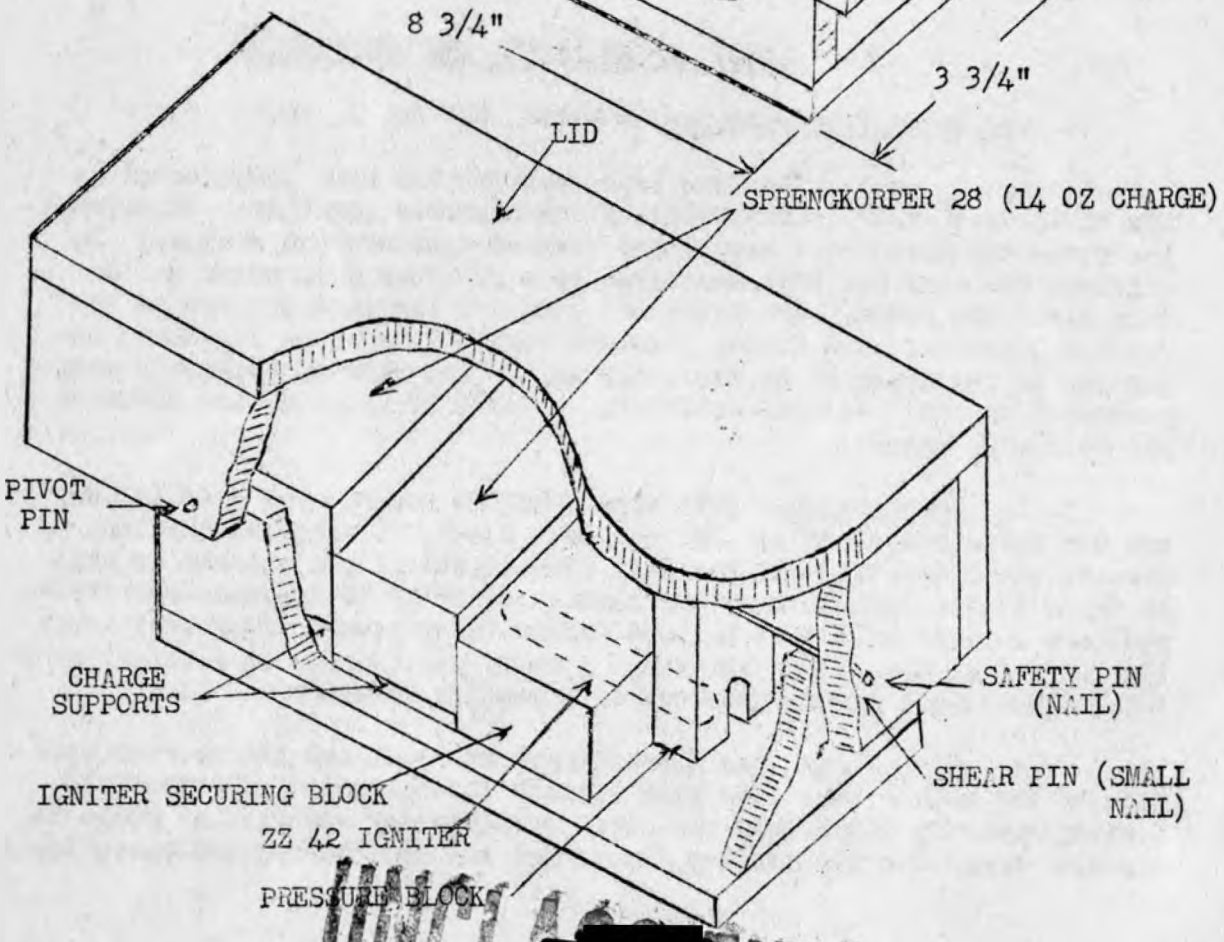
[redacted]

[redacted]

UNCLASSIFIED

NEW LARGE TYPE SCHU-MINE





UNCLASSIFIED

[redacted]

The safety pin (large nail) is then pulled from a safe distance and the mine is armed. Pressure of from 10 to 30 pounds will force the shear pin and activate the ZZ42 igniter, detonating the charge.

d. Neutralization: This mine is extremely dangerous and should not be lifted. If the mine has been laid very long, the shear pin will have rusted and the firing pressure will be very light.

2. New Anti-Personnel Mine (Source: SIB No. 260, OCE, ETOUSA):

a. Reports of what appears to be a new type of German anti-personnel mine have been received by the 2896th ETIT (C) from an Engineer Combat Battalion. Unfortunately, the mines found were blown in place and exact detailed description of them is not available. Two of the mines were found in the vicinity of EBERSHEIM, and three in the vicinity of DOMBACH. The mines were found on approximately 1 December 1944, but were first reported in a casual conversation during a mine class on 4 February 1945. A limited description of the mine is given below.

b. The mine is approximately the same diameter as the top of the Glass Mine (6 inches). The depth was unknown because the mines were buried up to the top. A black plastic igniter of almost the same dimensions as the ZZ42 igniter was fitted into the top of the mine, extending vertically. Unlike the ZZ42 igniter, however, this igniter was fitted with a three-pronged top like the S-Mine pressure igniter. The body of the mine appeared to be non-metallic and of a yellowish color, possibly clay.

3. Adaptors for S-Mine Igniters (Source: EIS No. 78, Ninth Army): The 2890th ETIT (R) has discovered adaptors for S-Mine igniters which make it possible to use the S-Mine 35 igniter with any German standard prepared charge. With these adaptors the S-Mine 35 igniter which required approximately 15 pounds pressure will be well suited for improved anti-personnel mines.

4. New Explosive (Source: SIB No. 265, OCE, ETOUSA):

a. The recent interrogation of a Prisoner of War gave the following information on the new explosive known as "NIPOLIT". The explosive is black or dark brown, has a smooth surface, is not brittle, and is manufactured in various shapes. P/W has seen a charge approximately 7 or 8 feet long and 1½ inches in diameter used as a bangalore torpedo to breach wire obstacles. He has also seen it in the shape of a cord ½ inch in diameter. In this shape it was used as a detonating cord.

b. P/W gave the following indication of the effectiveness of the new explosive: to blow a tree trunk 15 cm (6 inches) in diameter the Germans wind 15 turns of detonating cord around the trunk, whereas 5 turns of the new explosive are sufficient. However, an exact ratio of the respective diameters of the detonating cord and the new explosive cord is not available. The explosive is set off by the use of standard

detonators and [illegible] charge is necessary. The charges have no detonator wells, [illegible] detonators are tied or taped to the explosive. P/W states that the explosive can be cut by a saw, and believes it to be insensitive to shock. The thin cord can be broken.

c. It could not be ascertained to what extent the new explosive is used in the German Army.

5. New German Fuse Cord (Source: SIB No. 275, OCE, ETOUSA): The German Technical Army Journal of 15 January 1945, announces that a commercial triple-tarred time fuse will be issued in addition to the usual Zietzundschnur 30. The tarred fuse is not to be used for underwater demolitions. It is of the same diameter as the other and is packed in the same manner. The tarred cord and its container will bear the following legend:

Triple-tarred Time Fuse
Year of Manufacture:_____Firm_____No._____
Not to be used for underwater demolitions

6. Information Obtained from Prisoners of War (Source: SIB No. 275, OCE, ETOUSA): The following information was obtained from the interrogation of a Prisoner of War, by the 2898 ETIT (C):

a. Entlastungszunder 44: EZ-44's are laid under Tellermines in streets or other places where detonation of mine will cause considerable trouble and delay. Probable by-passes are also mined.

b. Topf Mines: Although P/W's unit has not laid any Topf Mines, he has heard that the weather affects Topf Mine Igniters and for this reason the GERMAN soldier is forbidden to remove these igniters. P/W knew nothing of an anti-removal igniter.

c. Tarnsand: P/W had not seen Tarnsand, but learned the following from other Non-Coms who had used it. A small amount was mixed with the soil covering the Topf Mine. This was done so that the gray Tarnsand could not be seen. There is only one detector that will detect Tarnsand, according to the P/W. The detector is named after a GERMAN city, with the year 1944. (Name could not be remembered.) The detector is made like a radio set, with one battery and ear phones. The detector is silent until something is detected. The mine detector has three separate and interchangeable heads, one for detecting metal mines under water, one for detecting Tarnsand, and the other for detecting metallic mines under normal conditions.

d. Panzer Mine (Not yet Named, but in Production): The mine has passed its testing stage and is entering production. It is a standard mine and not improvised. It is anti-tank or anti-vehicular, and can be laid any place. It can be run over many times without exploding, as long as the safety bar has not been removed. The mine can be armed at any time and is then set off by vehicles or tanks passing over it. It was designed so that it could be laid early and over a period of time become perfectly camouflaged.

e. Radio Controlled Minefields: P/W had heard that Radio Controlled Minefields were laid by corps engineer troops, and could be exploded up to 6 km.

f. Chemical Igniter Used Against Mine Detectors: P/W did not know the name, but said it worked as follows: The waves of the mine detector penetrate the igniter and sets it off. The igniter is used in Tellermines 42 or 43, and is easily removed. It also works on pressure. The igniter has 5 cells, each containing a different chemical. The pressure of a vehicle or a tank is required to set it off. P/W did not know whether it had any safety device or not. The only detector that will not set it off is the mine detector used to detect Tarnsand.

7. S-Mine 44: Specimens of the S-Mine 44 (used with S.Mi.35 igniters) have been found in the Ninth Army Sector. Details on this mine are contained in par I, 1, AFHQ Engr I.S. No. 50.

8. Waterproofed Schumine (Source: Twenty-first Army Group R.E. report): A waterproofed Schumine of new design has been found. The normal 200 gm Sprengkorper and ZZ42 igniter are in a closed wooden box waterproofed with tar. The end of the igniter body lies in a hole in the end of the box and is flush with its outside, the striker head and actuating pin protruding normally. This hole is waterproofed with mastic. A false lid of the same design as the lid of a normal mine is hinged to the back of the box by a staple. In the sample recovered, the igniter could be unscrewed by sliding the charge forward. If, however, the charge could not be slid forward easily, it would be necessary to force open the top of the box in order to neutralize the mine.

9. New Booby Trap (?) (Source: 235th Engr Combat Bn): On 22 February 1945 a civilian when leaving his house saw an object which appeared to be a red cigarette. He picked it up and lost three fingers from his right hand. He stated that the object exploded as soon as he picked it up off the ground and did not have time to perceive the nature of the object, but it appeared to be a red cigarette. He did perceive, however, that the object was not made of paper but of wood, plastic or some similar material, and was constructed somewhat larger and thicker than a cigarette, more similar to a fountain pen, and closed at both ends. The civilian stated that he did not have time to examine the object further, since it exploded as he turned it over in the palm of his hand.

II. OTHER FIELD DEFENSE WORKS

Nothing

III. COMMUNICATIONS (ROADS & RAILROADS)

Nothing

IV. BRIDGES (FIXED & FLOATING)

1. Construction of a Semi-Permanent Bridge at L891068 by the 185th Engineer Combat Battalion: While no unusual problems were presented in the replacement of this Bailey bridge, the accompanying photographs, illustrate the use of standard 32' prefabricated girders, and rebuilt abutments. Italian masons, supervised by Army troops were used on stone work.

2. Removal of Damaged Panels of Bailey Bridge in Place (Source: Engr Tech Int Sum No. 54, First Canadian Army): Six of the inside panels of the bottom story of a three-span double-double continuous Bailey bridge supported on pile bents were found to have been damaged. The method of repair was substitution of panels in place. The construction was increased to double-triple over the length of the center span and for the adjacent thirty feet on the adjoining spans, complete with Class 40 overhead transoms and sway-bracing to alternate bays. Two twelve ton loads in the form of loaded panel lorries were placed in the center of each of the shore spans to take out some of the deflection in the center when dealing with panels in this section. All chord bolts, rakers, bracing frames and transom clamps were then tightened throughout the bridge. A test was made on the extraction of the panel pins of the damaged panels and they were found to be reasonably slack. One complete bay of decking and transoms were removed and the damaged panels dropped downwards on a block and tackle and replaced with new panels. All triple story construction was then removed and the bridge remained as originally designed.

3. German Bridge Classification (Source: G-2 Report, Supreme Headquarters Allied Expeditionary Force):

a. The known German load classification for road bridges is as follows:

Class	I:	Two axled vehicles up to 24 (metric) tons, singly and slowly.									
"	II:	"	"	"	"	"	16	"	"	"	"	"
"	III:	"	"	"	"	"	7	"	"	"	"	"
"	IV:	"	"	"	less than 7			"	"	"	"	"

b. It has been rumored that there are new German load classifications, i.e. IA and IB. These are presumably heavier classifications and logical in view of the weight of modern tanks.

c. Information on these new load classifications and any additional information on road or rail bridge classifications is desired and should be forwarded to this Headquarters.

V. WATER SUPPLY

1. Water Divining (405th Engr Water Supply Bn Report):

a. The purpose: Because of the difficulty of obtaining adequate water close to the roads in the mountainous sector below BOLOGNA,

BRIDGE

the Fifth Army obtained the services of a water diviner to locate underground sources. [illegible] covers his employment on the problem of obtaining water in the forward area with a commentary on his method.

b. The problem (See map overlay):

(1) Terrain: The main artery of this battle sector is Highway 65, which runs atop a mountain ridge 1,000 feet above the valleys of the Torrente Savenna and Torrente Zena, just 3 kilometers on either side. Both of these streams carry plentiful water, and along the tortuous roads leading to the bottom of the valley may be found occasional springs of fair capacity. All of the side roads are one lane, winding truck-busters, which become slippery bogs when it rains.

(2) Water Supply: The reconnaissance of the 109th Engineer (C) Battalion, the 39th Engineer (C) Group, and the 405th Engineer Water Supply Battalion showed no adequate sources close to Highway 65 between FILIGARE (L869157) and LA GUARDA (L868277) along which troops were disposed. On 27 September 1944 a dry distribution point was installed by the 109th Engineers at L876268, and on 26 October 1944 another was established by the 39th Engineers at L862242. Company "C", 405th Engineer Water Supply Battalion supplied water to both of these dry points, using five 1,500 gallon tank trucks and six 700 gallon tank trucks to haul an average of 20,300 gallons a day during the three succeeding months over a round trip of 24 miles (two trips per day per truck at most).

(3) The Rocks: The surface geology is shown in the attached overlay. There are two rock formations in the area of interest: a buff-colored sand-stone, cropping out from LOIANO to the north of SABBIONI, and a gray-black, sandy marlstone, exposed from SABBIONI to LA GUARDA. Both are dipping about 30 degrees to the northeast, and both are permeable. Since it was necessary to drill for water on top of the ridge, on well drained lands, it was hoped to encounter, within the formation, an impermeable confining layer that would hold up enough ground water to provide a good well.

(4) Initial Drilling: Initially, two holes were drilled at the established dry points, because they are near the highway and have a turn-around. The first was drilled 310 feet in sandstone at L862242 near LOIANO, between 3 and 19 December 1944, but no water was found. The second was drilled 290 feet in the gray, sandy marlstone, at L876268 between 23 December 1944 and 8 January 1945, but this also proved dry.

c. The Art of Water Divining: Water divining, water witching, water dowsing, or rhabdomancy (Gr. rhabdos = rod) is an art in which a man locates water by extra sensory perception. In the usual method the diviner uses a live forked stick, held firmly between both hands with a point up. He then walks at slow even pace across the tract at which water is sought. As he approaches a supposed underground vein, the

branch begins to tre[illegible] his hand[illegible] he passes right over it the stick dips sharply do[illegible]ward. The force with which the stick moves is presumed to be an indication of the flow (quantity). Some water diviners use a pendulum which oscillates clockwise or counter-clockwise. Others require no indicator, experiencing a muscular sensation when in the zone of influence.

d. Water Diviner Jacobs. ([redacted]):

(1) Description: Jan Johannes Jacobs, 86527, (V), Sapper, 1st Field Company, South African Engineer Corps, was placed on temporary duty with the 405th Engineer Water Supply Battalion to locate water by divining, on 6 January 1945. Physically he is a slender man, 30 years old, 5'8" tall, and 149 pounds in weight. His complexion is swarthy, his eyes green and his hair black. He is of Boer (Dutch) ancestry, a native of Bloemfontein, Orange Free State, Union of South Africa.

(2) Experience: He has had seven years of schooling. He has served apprenticeship as a painter. In civilian life he worked principally for his father, drilling with Star and Keystone cable tool rigs. He prospected for water throughout the Free State by water divining at a fee of five pounds ($25.00) a job. He claims to have located over 2,000 wells, many of them below depths of 300 feet in sandstone. Both he and his father use a field study of the rocks and the surface to select the areas worthy of testing by divining.

(3) Service: In service with the British Army, he has served with the Indian troops in finding small, shallow sources to provide water for troop bivouacs. His success in Italy is reported to be good. In reconnaissance with the Fifth Army, he was observed to select an impervious layer in a formation of dipping sandstone, and trace it by eye to where it passed beneath a surface watercourse. He traversed that area with his stick. Most of the sites he has selected are related to present intermittent streams.

(4) Opinion: In Jacob's opinion, his water divining is a talent, just as others have an ear for music, an eye for beauty, or a hand of skill. He says it runs in the family. He believes that among people only a few possess the power. To him, the kind of branch is immaterial, just so that it is green enough to bend without breaking. He has success also with a copper wire, looped in tension. He says that he can detect only moving water; a brook or stream influences his branch, a still pond does not. Dry snow does not affect him, but a thaw, resulting in rivulets, disturbs him. He says that he cannot detect water running in pipes.

e. The Results:

(1) Selection of Sites: In the 41 days Sapper Jacobs was with this organization, from 6 January 1945 to 17 February 1945, he traversed on foot all the ground one kilometer on each side of Highway 65 from northing L [illegible] northing L [illegible] (Italy [illegible]00, sheet 98-I, LOIANO). He chose two sites worthy of drilling near SABBIONI, at

BOLOGNA,
14 km.

84
33

MLR

LIVERGANO

LA GUARDA

T. SAVENA

BARBAROLO

SABBIONI

T. ZENA

M. BASTIA

6532

LOIANO

T. IDICE

MONGHIDORO

HWY 65

6530

FILIGARE

MONTALBANO

6529

91
14

PASSO DELLA RADICOSA

PIETRAMALA

M. BENI

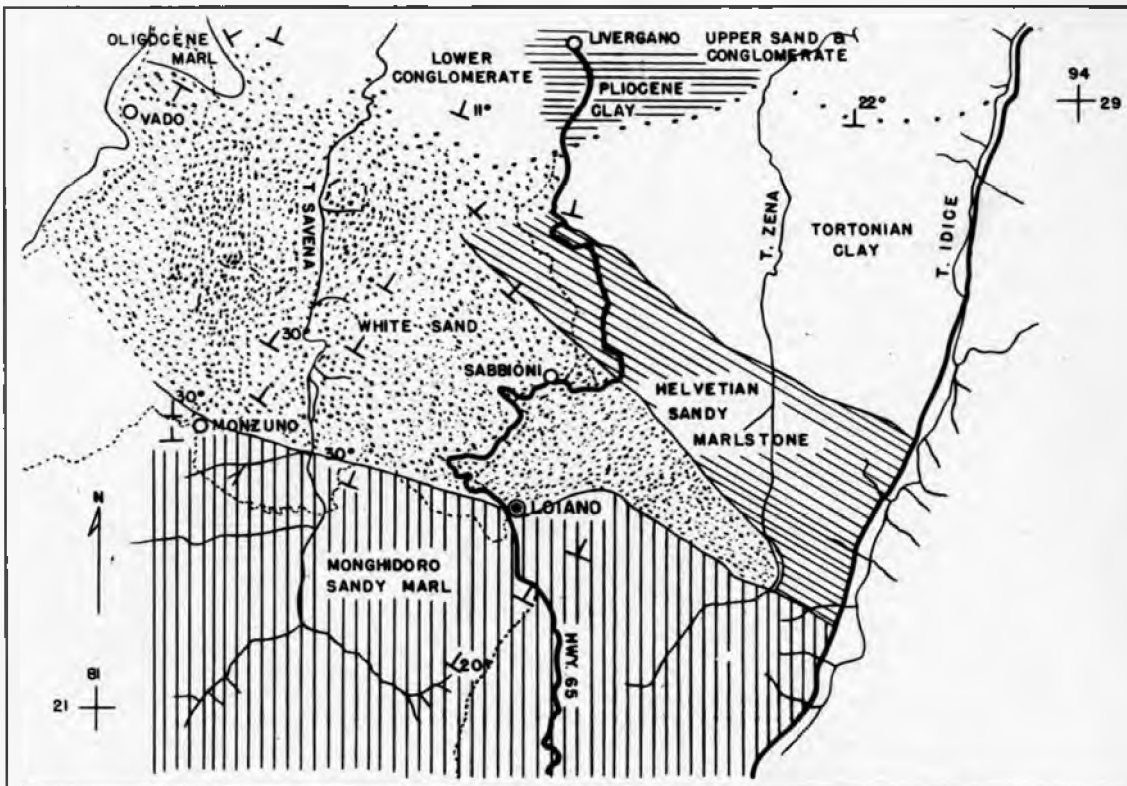
COVIGLIAIO

OVERLAY OF PORTION OF SHEETS 87-II, 98-I, 98-II, SCALE : 1/50,000

LEGEND

TOWN
VILLAGE
WATERPOINT
DRILL SITE

PHOTOLITHOGRAPHED BY 65TH ENGR TOP CO, U.S. ARMY, APRIL 1945



OVERLAY OF PORTION OF MAP SHEET 98, ITALY 1/100,000

MAP AFTER ROBERTO SIGNORINI. LE SERIE STRATIGRAPHICHE CENOZOICA TRA PIANORO, E VADO NEL BOLOGNESE RENDICONTI ACCADEMIA DELL' ITALIA. CLASSE OF SC., FIS, MAT E NAT, SERIE VII VOL 3, P 132, ROME 1941.

GEOLOGICAL MAP LEGEND

EPOCH	SUB EPOCH
PLIOCENE	UPPER SAND & CONGLOMERATE, CLAY, LOWER CONGLOMERATE
MIOCENE	TORTONIAN CLAY, HELVETIAN MARLSTONE, WHITE SAND
OLIGOCENE	MARL

MONGHIDORO SANDY MARL IS A FRACTURED COMPLEX OF EARLIER ROCKS LYING ON TOP OF THE YOUNGER TERTIARY BEDS, CARRIED OVER AS SLIDE DEBRIS FROM THE CRESTS OF THE THRUST-FAULTED APPENNINE FOLDS.

$\swarrow^{22°}$ -INDICATES DIP OF SEDIMENTARY BEDS, 22° FROM HORIZONTAL, IN THE DIRECTION SHOWN BY THE LEG OF THE "T".

PHOTOLITHOGRAPHED BY 66TH ENGR TOP CO, U.S. ARMY, APRIL 1945

L871255, and the other near LA FRATTA, at L876226, the latter being at a portion of the road under observation and shellfire.

(2) Drilling: On 10 January 1945 drilling was begun at SABBIONI, and continued to a depth of 210 feet. The rock throughout is a permeable, coarse to medium grained, calcareous, gray-brown, sandstone. After 50 feet of drilling, considerable surface water was filling the hole, so it was tested and pumped dry. At 175 feet it was tested again, and yielded 14 gallons per minute. At 210 feet it was bailed dry, after some of the upper formations had been sealed off with casing. Drilling ceased on the 31st of January 1945.

(3) Other findings: Jacobs also found a good surface source near RONCASTALDO, at L860212, and traced it east to about L866211, but it cannot be used because the upper road is under observation and occasional fire. Such was also the case for both the stream and the road at L860230. He found no other sources or indications on either side from thence to LA GUARDA, at L869277, where he obtained good reaction with the stick. Several shallow wells were tested in this vicinity by "C" Company, 405th Engineer Water Supply Battalion, but they all pumped dry after a short time, yielding only a few hundred gallons, and did not recover for many hours.

(4) Value of Negative Reconnaissance: Throughout his tour of duty, Jacobs was a conscientious worker, walking miles of hilly ground, avoiding minefields, in his search. Thus he eliminated any possibility of overlooking a source.

f. Critique:

(1) O Tempora, o Mores: Water divining, like many of man's customs, good and bad, has been practiced for centuries. In this age of reason and doubt, divining has been classed by most scientists as superstition. Still, even in America, divining is popular with some people, particularly with farmers, village boards, and small well drilling firms. The English and French Armies employ it today.

(2) The Spring: The green forked stick used in reconnaissance is so bent in the hands of the diviner that it is like a spring in unstable equilibrium such that imperceptible twists of the wrists cause it to agitate and finally snap down. At times, when the spring is released the torsion is violent enough to tear the bark. Thus, the reaction of the stick may be ascribed to imperceptible impulses of the diviner. These seem to be involuntary or subconscious. The author is convinced that Jacobs, at least, is sincere.

(3) A Reference: In Europe, in 1932, there was held at VERONA, Italy, the First International Congress of Rhabdomancy and Geophysics. Many papers were presented and tests run by diviners from Italy, Switzerland, France, Germany, Roumania, and smaller countries, and these are assembled in a report: Atti UFFICIALI I° Congresso Internazionale di Rabdomanzia e Geofisica. Fiera di Verona, 1932, X, 14, 15, 16, 17 Marzo; printed by Remigio Cabianca, Libraio - Editore, Verona 1933-XI. Rabdomancy is compared to telepathy, to the orientation of homing pigeons and to electromagnetic waves. One theory considers that each substance emits a

wave of a different frequency, which is detected by the human organism. Most individuals are in harmony with thousands of transmissions, and ignore them, but the diviner is unbalanced in respect to the emmision for which he is searching, such that he feels a sensation or muscular contraction. Another theory considers that it is a phenomenon of electrostatics, where the organism is at different potential than the earth beneath which the object is located. It suffices to say that these people are collecting evidence, making measurements and separating fact from fiction, so that some day they may be able to present the world with reliable results.

g. Conclusion: Conclusive results on water divination have not been attained. Adequate water was not found.

VI. CAMOUFLAGE

1. MONSUNO Road Screen (Co D, 84th Engr Camouflage Bn Report):

Problem:

a. To screen a portion of Route 6532, from MONSUNO, north to a point one mile distant. The road, under enemy ground observation, was to be used as a jeep trail for evacuating wounded, delivering messages and supplies during daylight hours.

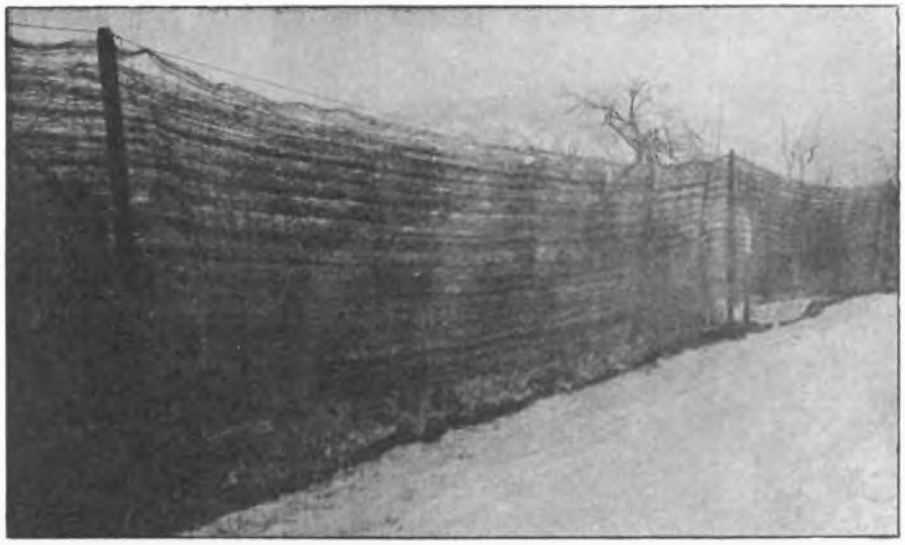
b. It was planned to erect a screen of chicken wire garnished with steel wool. The length of the screen was to be one mile and the height six feet. Steel pickets spaced at fifty foot intervals were to be used as upright supports for the screen.

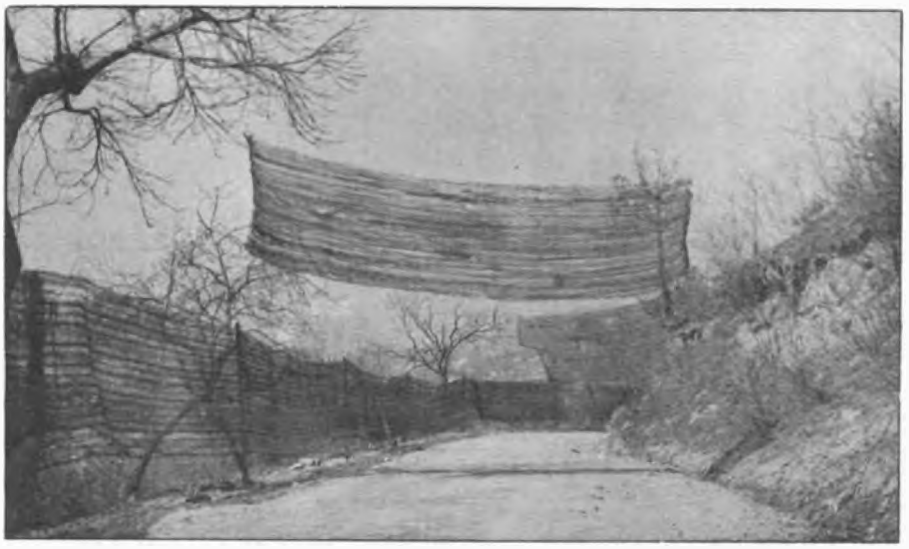
c. Due to the enemy observation on the road, work was done at night. Five foot steel pickets were driven into the ground two and one half feet, at fifty foot intervals. Then two additional five foot pickets were wired together and secured to the pickets already in the ground, to give the desired height. Number ten wire was then strung through holes in the top of the pickets tightened and secured to a stake in the ground at every fifth picket. This wire served as a suspension for the screen. The chicken wire was then unrolled and secured to the number ten wire by short lengths of number sixteen wire. The bottom of the screen was secured to the ground by stakes. Overhead lateral screens were constructed at points where enemy observation could not be obliterated by the continuous screen which ran parallel with the road. These overheads were constructed in the same manner as the rest of the screen.

d. Materials:

Garnished chicken wire	roll	79
Pickets, 5 ft	ea	390
Pickets, 2 ft	ea	35
Wire, #10	ft	8000
Wire, #16	ft	2000
Spikes	ea	50
Tracing tape	roll	1
Wooden posts 16 ' & 25'	ea	26

ROAD SCREEN





PRINTED BY ENGINEER HQ. FIFTH ARMY

e. To[illegible]

2. TROJAN HORSE M-2 (Source: DAF IS 236):

Spitfire pilots have given the following account of the latest fashion in camouflaged tanks as seen by them on the road southeast to PADUA at G171589 at 1440A on 9 March. Three shapes were seen which, on first inspection, appeared to be three hayricks towed by three horses. It is reported that there was an unnatural precision about the hay and a certain lack of animation about the horses. Pilots insist that under each hayrick was a tank over whose gun was draped the semblance of a horse. Credence is given to the situation by the fact that two of the hayricks soon wheeled off the road in the unmistakable manner of tanks. The third chugged on. In the subsequent attack, bullets were seen to bounce off the contraption, last seen careening towards some houses with its hay awry and the horse's hoofs clear of the ground.

3. Railway Camouflage (Source: Spec Int Bul No 260, Int Div, OCE, European Theater of Operations):

a. A Luftwaffe camouflage expert, now a P/W, provided an interesting detail on current practice in the concealment of railway installations. He said that railway sidings servicing warehouses and factories in Western GERMANY provide a major camouflage problem and the following methods are most frequently used to create deception:

(1) Trees are simulated between lines and buildings to give the lines the appearance of being independent of the building.

(2) Building and sidings are completely covered with camouflage netting so that the actual sidings are in an artificial tunnel, and dummy lines are created around the outside of the netting in order not to draw attention to the sudden disappearance of the line.

b. Net camouflage is always used, whatever the extent of the installation. Various examples have previously been reported of marshalling facilities and detraining areas camouflaged in this manner. It is worthy of note that the dummy craters first seen in FRANCE and most recently observed in late November at HAM, have apparently been abandoned as unconvincing.

VII. GENERAL CONSTRUCTION

1. Cub Air-Strip with 15% Grade (185th Engr Combat Bn Report):

a. On March 1, 1945, a work order was received to construct a 750 foot air-strip and cover with pierced steel planking. Location of the site was to be on a hill site whose natural slope was approximately 16 percent. General specification for the strip: Maximum slope 15 percent, 20 foot width of pl[illegible], with 6 foot shoulders.

b. The field was constructed with two slopes of different grades connected by a vertical curve. The lower end of the strip is on a 6 percent grade for 300 feet, the upper end on a 15 percent grade for 450 feet; the two slopes are connected by a 300 foot vertical curve. The sections for both cut and fill are as shown on the attached plan.

c. (1) Excavation for the strip was done with 1 - D7 and 2 - D8 tractors with angledozers, and 1 - 8 yd and 1 - 12 yd scraper, towed type, which were towed by the D-8. Considerable difficulties were encountered with the use of scrapers as the strip contained a very great number of large boulders, some as great as five feet in diameter. The smaller boulders were dug out with a dozer and picked up by a scraper. Larger ones were pushed clear of the strip. The removal of these boulders caused the actual time of excavation to be greater than that estimated. There were 2550 cu yds of earth and stone excavated from the upper section. A total of 3220 yds of fill was required to bring the lower section up to grade. Approximately 700 yds of borrow were required. As excavation neared the final grade 3 springs were uncovered on the strip and required subsurface drainage to eliminate them.

(2) Final grade and smoothness for the strip was obtained with a motorized grader and a squad of Italian labor with hand shovels filling up holes and removing rock near surface. Ditching was done with a towed grader.

(3) Salvaged pierced steel planking was used to cover the strip. For laying the plank 338 man hours were required. The speed in laying of the plank was reduced because hooks on each piece of salvaged plank usually required some straightening and hammering to get it into place. A 14" stagger was used in the joints of the planking. The upper end of the steel planking for a length of 5 feet was buried in the ground to a depth of 2 feet, spiked with steel pickets, and covered with stone to prevent creeping.

d. Men and Equipment:

(1) Disposition of Man Hours:

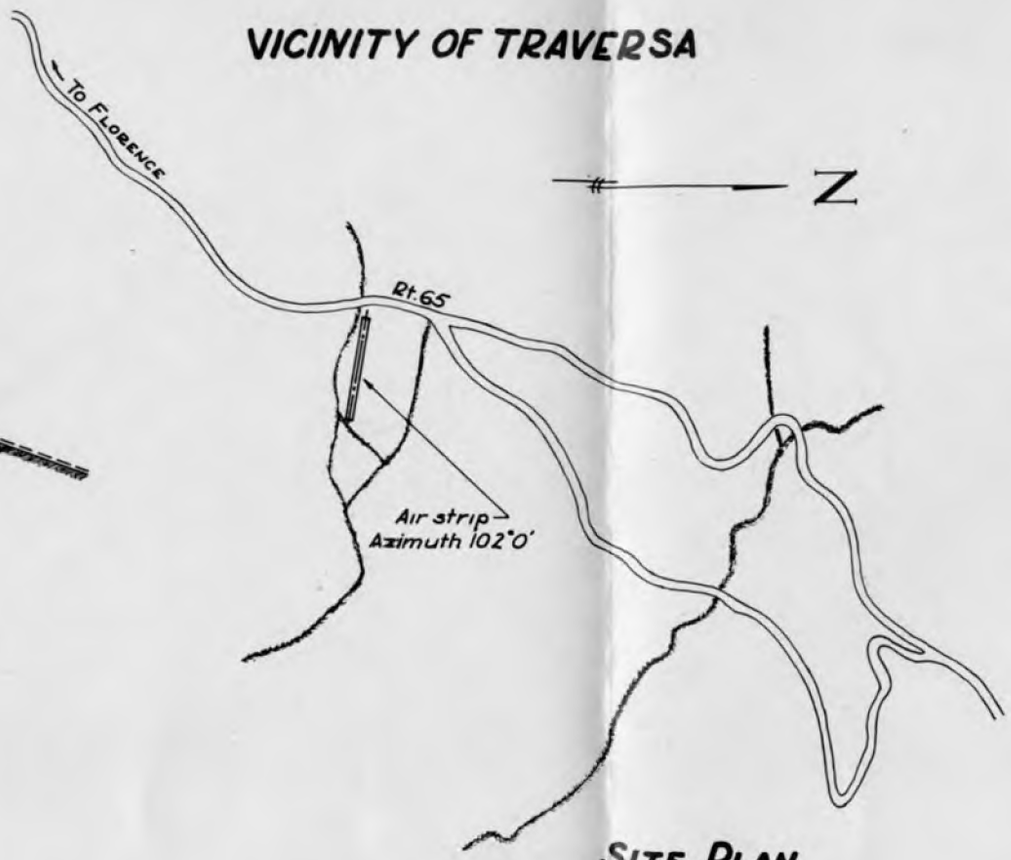
	Military Personnel		Civil. Employees	
Hauling Planking	24 x 12	288	----------	
Excavation & Grading	31 x 9	279	40 x 7	280
Laying of steel planking	22 x 9	198	20 x 7	140
Drainage & Policing site	----------		20 x 7	140
Total		765		560

A grand total of 1325 man hours, Military & Civilian.

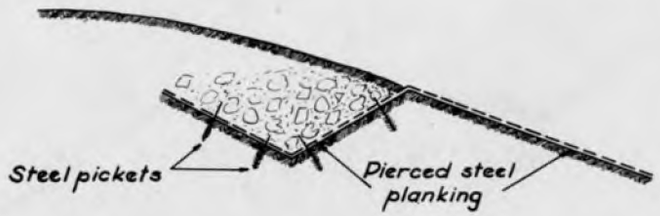
(2) Disposition of Equipment:

1 - D-7 Dozer	46 hours
1 - D-8 Dozer with 8 yd scraper	38 hours
1 - D-8 Dozer with 12 yd scraper	28 hours
1 - Towed grader (Towed with above D-7)	6 hours
1 - Motorized grader	14 hours
Total equipment hours -	132 hours

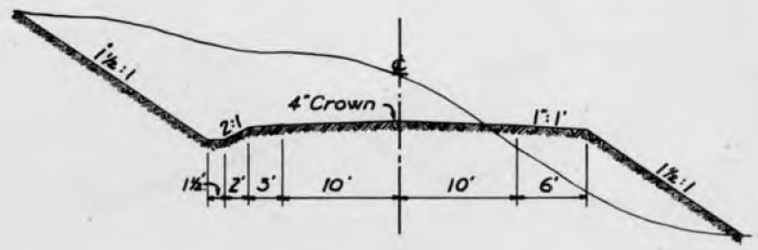
VICINITY OF TRAVERSA



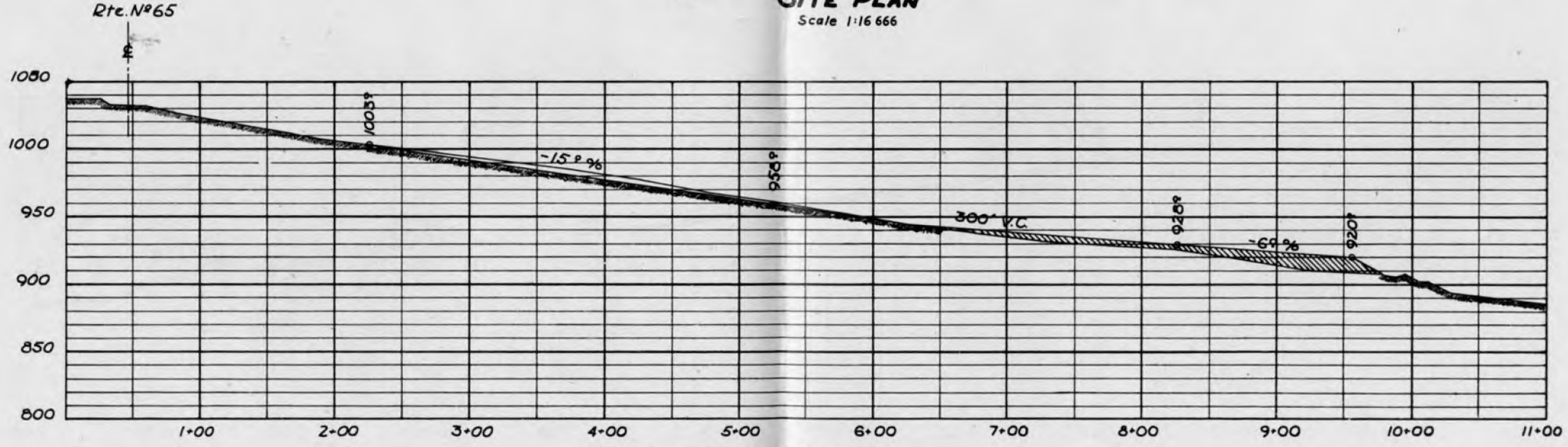
SITE PLAN
Scale 1:16 666



ANCHORAGE FOR PLANKING



TYPICAL CROSS SECTION
Scale 1"=16'



PROFILE OF AIR STRIP
Horiz. scale 1"=100'
Vert. scale 1"=100'

1338 ENGINEER (C) GROUP
ENGINEER SECTION

CUB AIR STRIP
SCALE AS NOTED

PHOTOLITHOGRAPHED BY 68TH ENGR TOP CO, U.S. ARMY, APRIL 1945

CONSTRUCTION OF AIR STRIP

e. Construction on the air-strip started on March 1, 1945 and was completed on March 9, 1945, a total of 9 days. It would have been possible for planes to land at the end of 6 days, because a sufficient smoothness had been obtained by that time and the strip was hard and dry. A total of 1325 man hours was expended for the construction of the strip. The greatest difficulties were encountered in excavation for the strip. It was found with the large boulders embedded in the strip, that the scrapers would slide over them and fail to cut. Many additional trips were required with the scraper. A total of 132 equipment hours were required for excavation and grading.

f. Report of Air-Strip by Artillery Pilots:

(1) It was assumed that the use of the strip would be very limited, with high restrictions because of turbulent mountain air and because of the higher landing speeds encountered at the altitude at which the strip is situated. It was decided that the angle of incline caused by the strip being built on the side of a mountain would offset the shortness of the strip and would thus offset the higher speed necessary due to the altitude involved.

(2) The strip has proved more satisfactory than originally anticipated and is considered very well designed and constructed. The restriction regarding flying in turbulent mountain air is still a limiting factor, however only high winds have proved disqualifying. Landings with L-5 aircraft are made with less than full flaps and L-4 aircraft can land at speeds well above 3-point landing speed. Both types liaison aircraft roll to a complete stop before reaching the upper end. Takeoff is accomplished very safely with flying speed attained after using 2/3 of the strip. There is almost no restriction on takeoff because of turbulence, as compared to turbulence effecting landings under conditions of high winds.

(3) There are 2 undesirable features both of which are overcome by pilot alertness:

(a) One feature is that the upper end of the strip is not designed properly to permit easy ground handling of the aircraft. An aircraft taxiing on to the actual runway from the small parking space might over-balance and nose up if the pilot taxis carelessly, or applies brakes too violently. A smoother "ramp" from the parking space to the actual runway would be more desirable. It is necessary to roll or taxi completely on to the parking space to enable turning the aircraft around for takeoff, because the angle of incline of the runway is too great to permit swinging the tail of an aircraft without assistance. A flat parking space is necessary because a pilot usually desires to perform a short pre-takeoff engine and aircraft check which is hardly possible if the pilot is occupied with holding the brakes or is concerned that the aircraft will "nose up" when the engine is run up.

(b) The other undesirable feature is the nature of a landing strip on a mountain side. Until some experience is gained it is difficult for a pilot to judge his altitude in reference to the strip. Unless the exact altitude is known, it is difficult to judge as to whether a landing approach is being made at the proper altitude.

(4) The inclined portion of the strip represents about 2/3 of the total length, with the first third seemingly level. This is a very desirable feature and it has been found that the design of the curve onto the inclined portion is such that an aircraft is not bounced into the air even if flown in for a landing at greater than landing speed.

2. Pioneer Tramway (126th Mountain Engineer Battalion Report):

a. Scope: This report summarized the tactical construction, use, and operation, of the Pioneer Light Tramway M1. This equipment was used successfully in the M. SERRASICCIA - PIZZO CAMPIANO ridge phase of the 10th Mountain Division operation from 19 to 24 February 1945.

b. Construction: All personnel of Company D, 126th Mountain Engineer Battalion were used in this project. Upon securement of the ridge, an access road was constructed to the proposed tramway sight. Tramway reconnaissance was completed during access road improvement. On the night of 19 February 1945, one platoon moved equipment from VIDICIATICO to CA di JULIO. At dawn about 0730, 20 February, 1945 actual tramway erection began. Eight hours later under supervision of Lt Herold McKay, the remaining two platoons completed the job.

(1) Logistical Data:

(a) Materiel was erected as tramway.
(b) Slope distance approximately 1700 feet (rated distance maximum 2,000 feet).
(c) Vertical rise 602 feet.
(d) Number of men used, 130.
(e) Average slope, 18 to 20 degrees.
(f) Equipment used: standard set pioneer Light Tramway and Cableway M1.

c. Use: Due to the existing supply system, tramway did not supply initial units to gain ridge. This unit, however, put the tramway to immediate use for evacuation of about thirty wounded men. The same unit evacuated about twenty American and enemy dead. Litter bearers, a local security patrol, and personal material and weapons moved both up and down the tramway until the first tactical relief of the ridge was made. Relieving unit initially included the tramway in their supply system. From 21 February on, three-quarters of all supply was delivered to the bottom tramway terminal and picked up from top terminal by mule trains. Tramway eliminated forty percent of original mule haul.

PIONEER TRAMWAY

BOTTOM OF TRAMWAY

CRADLE IN USE

LOOKING DOWN ON LOADING PLATFORM

TOP END OF TRAMWAY

(1) Supply Logistics:

(a) Equipment has operated for six straight days from 18 to 20 hours per day.
(b) Approximately 5,000 lbs. of supplies per day have been sent over tramway.
(c) An estimated 20,000 lbs. of supplies per day could be handled. Present limitation is capacity of mule trains from top terminal to ridge.
(d) Tramway transports 400 lbs. every twelve minutes, this includes loading and unloading for each trip.
(e) One ton per hour has been transported but not for any continuous periods.

d. Operation and Maintenance: Tramway requires one platoon for continuous twenty four hours operation. One squad operates nine hours per shift overlapping by one hour the following shift. Each squad is disposed as follows: 1 NCO, 5 EM at bottom terminal operating power unit and phone; 2 EM at middle "A" frame operate telephone; 1 NCO, 3 EM at top terminal control cable tension and phone. Power unit requires servicing three times daily. Motor should be overhauled once weekly.

e. Recommendations and Conclusion: All cable clamps should be checked continuously. Smith grips on track cable terminals should not be used except where a safety strap is used also. Motor should not be idled and should be run at 2,000 to 2,500 r.p.m. This project has proven very satisfactory within its limits. It was found that although mule transport could not be entirely eliminated, its capacity was doubled.

VIII. ENGINEER SUPPLY

Nothing.

IX. EQUIPMENT

1. Herbert Bridge.

a. Two Herbert Bridges were found on Route 73 West of OSTERIA. No information is available as to who built these bridges or when. The length of span in each case is 32 ft. 8 in.

b. A complete description and history of the development of the Herbert Bridge may be found in:

Notes on Enemy Bridging No. 6
- The Herbert Bridge -
M1 - 10
The War Office
May 1944

c. The dimensions of the bridge parts are as follows:

Top chord -- 2 channels, back to back spaced 4 inches apart, 8" x 3" flanges x 3/8" web thickness x 110" long.

Bottom chord - 2 channels, back to back spaced 2 ft. 4 in. apart, 8" x 3" flange x 3/8" web thickness x 110" long.

Vertical bracing members - - 2 channels back to back, spaced 3/4" apart, 3" x 1 3/4" flange x $\frac{1}{4}$" web thickness.

Upper chord bolts - - $3\frac{1}{2}$" diam. x 16" long with threaded section on each end, $2\frac{1}{2}$" diam. of thread, $2\frac{1}{2}$" length of thread and 8 threads in this length.

Bottom chord bolts - - 4" diam. between channels, $3\frac{1}{2}$" diam. section at junction of channels, with threaded section on each end, $2\frac{1}{2}$" diam. of thread, $2\frac{1}{2}$" length of thread, and 8 threads in the length. Total length 2 ft. 11 in.

Upper and bottom chord bolt nuts - - Hex. nuts, 4 3/4" across flats, 2" thick.

Bottom chord bracing - -

(a) Intermediate round spacers - 3" diam. x 2 ft. 7 in. long with 1" diam. thread, 2" long at each end.

(b) Cross bracing - 2 channels, back to back, spaced $\frac{1}{2}$" apart, 2" x 1" flange x 1/8" thickness.

Transoms - - - I-beams 11" x 4 3/4" flange x $\frac{1}{2}$" web thickness x 15 ft. long. There are 4 pairs of pips welded to the flange of the I-beam 3" long x $4\frac{1}{2}$" wide, each pair spaced 1" apart with a 5/8" bolt 3" long through the center of the pair. The pairs of pips are evenly spaced $35\frac{1}{2}$" apart center line to centerline of each pair.

Flooring - - Rough unfinished timber approximately 4" thick and varying width with guard rails 8" square.

HERBERT BRIDGE

d. This bridge has a good feature in that by its bolted construction it can easily be broken down into very small parts thus facilitating transportation. However, this bridge does not have the flexibility in construction for varying load capacities over varying spans as does the Bailey bridge.

2. German Explosive Boat (See Plate):

3. Optographical Plotting Device "LUZ" (Source: Engr INTREP No. 285, Second British Army): Evidence is available that the German Army has an optographical plotting device known as the "LUZ". The "LUZ" is used in viewing maps and photographs simultaneously. Its basic element is a semi-silvered or half-silvered prism. All units are urged to watch for this or other similar equipment and to forward all such equipment to this headquarters as soon as possible.

X. PUBLICATIONS

Below is a list of recent acquisitions to the Command Headquarters Library. These documents are available on a loan basis to all Fifth Army 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.

Engineer Board Reports

No.	847	Tractor Mounted Earth Auger	1 August 1944
	895	Low Speed Tractors as Prime Movers for Field Artillery in Jungle Terrain	11 December 1944
	896	Lists of Operational Characteristics of Mine, Anti-tank, Heavy, T6E1	13 December 1944
	897	Seventh Interim Report, Development and Army Floating Bridge Equipment	15 December 1944
	900	Methods of Passing Vehicles over Areas Similar in Character to Rice Paddy Fields	2 January 1945
	901	Interim Report on Development and Testing of the Twin-Screw Utility Power Boat.	28 December 1944
	905	Seventh Interim Report, Equipment for the Passage of Enemy Minefields	1 January 1945
	906	Detonating Cord Cable Kit	15 January 1945
	907	Lists of Air Lift Pumps for Deep Wells	21 January 1945
	908	Snooper Scope and Sniper Scope	30 January 1945

Technical Manuals

No.	28 - 205	Army Education Program for Inactive Theaters	Nov 1944
	5 - 280	Construction in the Theater of Operations	Dec 1944

No.	5 - 1723	War Department, Operating Manual	Feb 1944
	5 - 2037	Pump, Centrifugal, Gasoline Engine Driver, Model B-180	Jan 1944
	5 - 9598	Pile Driving Rig, Wood Construction	Sep 1944
	5 - 9262	Refrigerated Warehouse, Prefabricated	Mar 1944
	11 - 469	Communication Security	Dec 1944
	55 - 310	Stevedoring	May 1944
	5 - 362	Engineer Port Repair Ship	Oct 1944
	5 - 9005	Pipe Line Set, to be mounted on truck	Jan 1945
	9 - 855	Targets, Target Material and Training Course Lay-outs	Aug 1944

Other Publications

Equipment for Traversing Muddy Terrain - War Dept	Nov 1944
Report on the Dummy Bridge-Seventh Army River Crossing Schools	Nov 1944

XI. MISCELLANEOUS

1. Enemy Engineer Equipment Desired for Intelligence and Research Purposes: Listed below are items of enemy engineer equipment desired for intelligence and research purposes. In principle, two specimens, the best available, are required; up to twelve specimens of small items are desired. The finding of any of the items listed, or any other types thought to be new and not listed, should be reported through technical channels to the Army Engineer, giving the location. Where possible, arrangements for the safeguarding of specimens should be made.

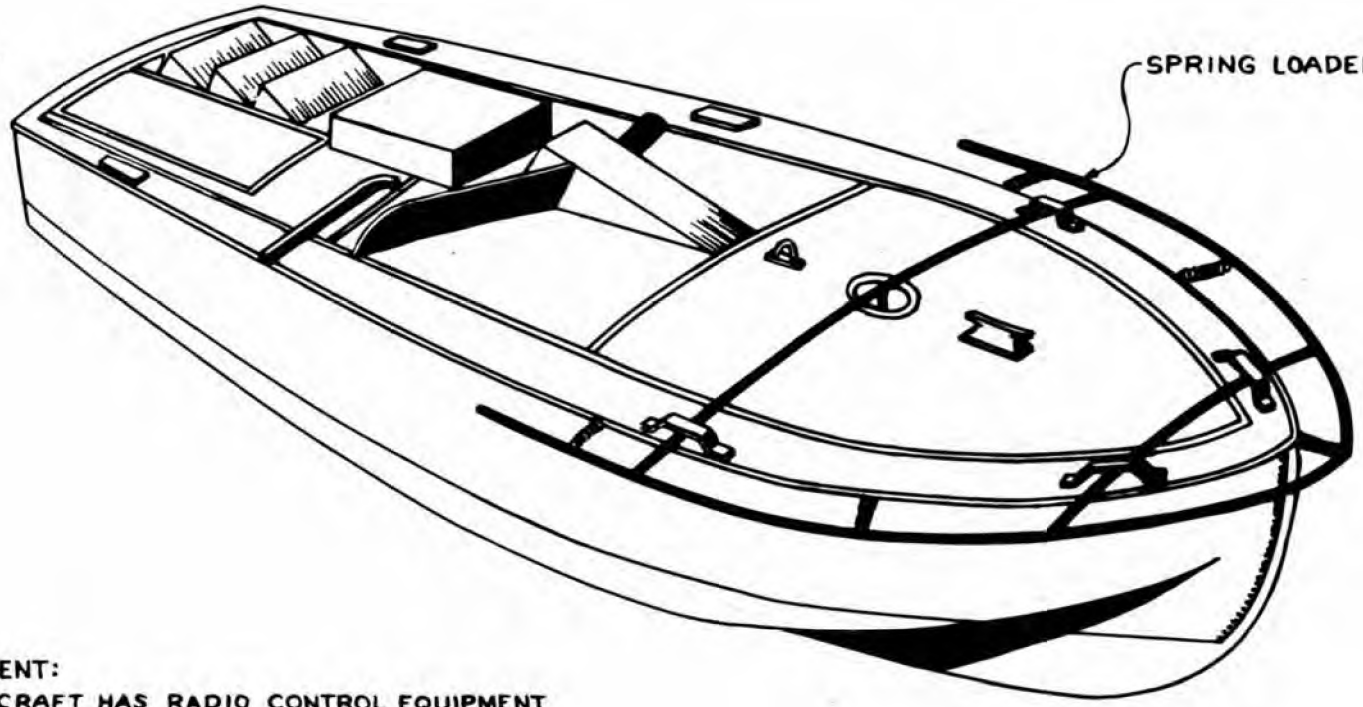
a. Igniters:

Kippzunder 43
T.Mi.Z.43, types I and II
Knickzunder 43/I and 43/II
S.Mi.Z.44
Long delay igniter, 120 days
Long delay igniter, 160 days
Entlastungszunder 44
Schuko igniter
Zunders prengkapsul 43
Kesselsprengerat
Norwegian made wooden push or pull fuses.

b. Mines, detectors, etc.:

Eismine 42
Glasmine 43 (f)
Panzerstabmine 43
Landsitzmine
S.Mi.44

[redacted] UNCLASSIFIED



COMMENT:

THIS CRAFT HAS RADIO CONTROL EQUIPMENT SIMILAR TO THAT USED IN B.4 DEMOLITION VEHICLE. THE CHARGE IS APPROX. 600 LBS. IN THE FORE PART OF THE BOAT WHICH IS SURROUNDED BY A SPRING LOADED GUARD RAIL WHICH FIRES THE CHARGE ON IMPACT. THE LENGTH OF THE BOAT IS APPROX. 15'-16'

GERMAN EXPLOSIVE MOTOR BOAT

(RECONSTRUCTION FROM GROUND PHOTOGRAPHS)

REPRODUCED FROM NINTH ARMY E.I.S. NO. 90.

PRINTED BY ENGR HQ, FIFTH ARMY

Panzerschnellmine A and B
Field exploder 42 (Gluhzundapparat)
Tempelhof 41 Mine detector
Koln 40 mine detector
Weisbaden 42 mine detector
Stuttgart 43 and 43/2 mine detectors
Listening apparatus (Sperren Horchgerat 42)
Remote controlled demolition vehicle: FKL - Panzer
N.S.U. Springer
Tarnsand
Demolition blocks 7 oz (bakelite container)
Detonating fuse
Plastic explosive
Reports on improvised mines
New large type Schumine
Nipolit explosive
Adaptors for S Mine igniters
New type stock mine
Clay mines

c. Miscellaneous:

Camouflage detection devices
Water distillation unit (1000 - 5000 gal capacity)
Gas driven deep well pumps (25 to 200 G.P.M. at 300 ft)
Water storage tanks of variable capacity
Calcium hypochlorite (for water treating)
Rubber boat (18 by 6 ft, 330 lbs)
Compressed gas cylinders
Prefabricated decoys and dummys
Welding electrodes
Pocket knifes
Camouflage fish nets
Camouflage paints
Camouflage face paints
Infra-red reflecting paints
Phosphorescent paint
General purpose ramp steel
Phosphorescent tape and paper
Power tools not using metric system
Hand tools
Infra-red equipment (sniper scopes)
Electric arc welders
Oxy-acetylene welding and cutting equipment
Details of German bridges

UNCLASSIFIED

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 [redacted].

FRANK O. BOWMAN
Brigadier General, USA
Army Engineer

UNCLASSIFIED