

TECHNICAL BULLETIN—5

FEBRUARY 1966.

SOIL CONSERVATION SERIES—5

RECLAMATION OF ILL-DRAINED SOILS

at villages Nagansur and Agalgaon in
Sholapur District

DEPARTMENT OF AGRICULTURE,
MAHARASHTRA STATE, POONA-1.

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FOREWORD

Recent political developments have brought out how important it is that our country should become self-sufficient in food.

India's population is increasing faster than her food production. This is a very serious problem. To achieve the self-sufficiency, the Prime Minister of India has put food production on a war footing and given it the status of second line of defence.

It is not difficult to achieve this objective. The production of food grains can be increased either by bringing additional area under cultivation or by adopting intensive cultivation measures on the area already under cropping. Crop yield can be increased by proper soil management. The soils which were once very productive are thrown out of cultivation due to improper soil management. Neglect of water courses and nallas have caused water stagnation. This has resulted in accumulation of harmful salts. Under such conditions crop growth is not possible.

We have in our State an area of about 15,00,000 acres of ill-drained soils. If this area is reclaimed by adopting various reclamation measures, we will be able to increase food grain production considerably.

Some ill-drained pockets have been located in Sholapur District. Attempts are being made to improve these by adopting various reclamation measures. The work carried out at villages Agalgaon and Nagansur in Barsi and Akkalkot Talukas respectively, has been described in this technical bulletin. It is hoped that this would serve as a guide both for field workers and for the cultivators and will help in bringing additional area under cultivation.

The data incorporated in this bulletin have been recorded by Sarvashri R. V. Date, Sub-Divisional Soil Conservation Officer, Akkalkot and C. M., Gokhale, Sub-Divisional Soil Conservation Officer, Barshi I, under the technical guidance of Dr. N. K. Ghumare, Divisional Soil Conservation Officer, Sholapur who has prepared the final draft of this bulletin.

POONA-1,
31st December 1965.

}

M. B. GHATGE,
Director of Agriculture,
Maharashtra State, Poona-1.

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ILL-DRAINED PROJECT AT VILLAGE NAGANSUR, TALUKA AKKALKOT, DISTRICT SHOLAPUR

Introduction

Food grain crisis is discussed everywhere and every day. The problem is of a very serious nature, and to meet the national requirements crores of rupees are being spent for importing Food grains. Our soils are said to be very fertile and productive. However, our per acre crop yields as compared to foreign countries, are very poor.

Productivity of the land depends upon many factors. For good outturns the land requires good warmth, moisture, sufficient manures, timely tillage operations, healthy seed and good drainage.

Out of many factors which affect the productivity of the land, ill-drainage is one of the principal factor. The water-table in the soil rises and soluble salts start accumulating. Thus the lands are either turned alkaline or saline and become unfit for crop growth. As time passes, the soil is so spoiled that even grass cannot thrive in such soils.

The soils in Sholapur District are deep black and rich. This is a rain-shadow area. The scanty rains do not suffice the thirst of the lands which ultimately results in poor crop production. This is supposed to be the famine tract.

Good drainage is one of the foremost requirements for successful crop growth. The sandy loam or loamy soils are always fairly drained. This is not the case with clayey or rich soils. Rich soils are generally ill-drained and if proper tillage operations and soil management are neglected the lands give poor outturns. Thus the soils become infertile early.

Reclamation of such soils has become a serious problem now-a-days; as thousands of acres of fertile and productive lands have been affected. In Sholapur District an area of nearly 30,000 to 50,000 acres is thus affected due to ill-drainage. The area in Akkalkot taluka so affected comes to 5,000 acres approximately. The common reasons for this are obstructions in natural water courses and negligence in management of lands and lack of knowledge about improved practices of farm management.

Short History

The lands at Nagansur are mostly deep black and rich. Formerly this village was said to be the "Granary" of jowar of Akkalkot taluka. But in recent years due to the changes in rainfall and other climatic conditions, it is observed that the lands are deteriorating in crop yields. They are becoming saline and as salinity status has increased considerably, they are turned unsuitable for vegetation. At many places white crustation is observed on the surface of the lands. Black alkali is also noticed at some places. In such heavily affected soils, not only the normal crop but even grass cannot grow.

After careful observations and detailed studies, it was decided to tackle this problem and a pilot project was selected in each taluka. Project at Nagansur is one of them.

Project at Nagansur comprises of two blocks viz. No. 3 and No. 4 each measuring 46.26 acres and 57.14 acres respectively. Total area comes to 104 acres. The lands of these two blocks are not completely damaged but are partially affected. This project is, however, selected as a demonstration to convince the cultivators about the land reclamation practices.

Problem

It is observed that the lands in this project have become saline due to the silting of the gully and nalla courses which have resulted in raising

the water-table to the surface zone. The soils being deep and clayey, the percentage of soluble salts has increased to a considerable extent which ultimately has turned the soils unfit for vegetation.

Before 8 to 10 years the cultivators used to grow crops like Sugarcane, Chillies, *tur*, *jowar*, and irrigated wheat and the outturns were very satisfactory. In recent years, the land has become useless for crop growth and the farmers are not in a position to grow even a bag of *jowar*. The lands are, therefore, fallow for the last 8 years.

The reclamation of the soils thus affected comprises of three-fold activities viz:—(1) Mechanical, (2) Chemical and (3) Cultural.

One or all these measures are necessary to be undertaken for reclamation of such soils. The problem is to improve the saline lands of Nagansur Project by adopting these measures and finally to make the soil suitable for crop growth. For the present the problem is tackled by adopting mechanical measures.

Method of Improvement

A close survey with a grid of 55 feet was first taken and all the details, the ridge and valley lines, slick spots, vegetation, natural gully, courses, crops grown, incrustation, old bunds etc. were marked on the survey map. Soil samples from 0 to 1 foot depth and 2 to 3 feet depth were collected and sent for analysis along with well water sample. Sample pits were also taken for horizon-wise studies.

The following observations are recorded:—

1. pH of the soil ranges from 7.8 to 8.8.
2. Total soluble salts from soil samples vary from 0.23 to 3.38.
3. Soils are very deep 8' to 10' and black in colour.
4. The soils are clayey and shining lustre is seen when cut.
5. Sand layers of 1" thickness in low lying patches are observed.
6. Water table is very high 2'-4" to 3'-2" below ground level.
7. Well water is unsuitable for irrigation.
8. Level of water in the well in the month of March was 3'-4' below ground level.
9. In the lower portions near nallas, percentage of sand is more.

The land, therefore, was levelled, contour map was prepared and then by noting the positions of ridge and valley lines, drains were aligned on the contour map.

After considering the upper catchment area the drains and their sections were designed, plans and estimates were prepared and on 27th April, 1965, the work of opening of the drains was undertaken. Where there was normal crop growth and in the area under command of high floods of nalla, closed drains are proposed and open drains are proposed for the badly affected areas. The open drains will wash out most of the salts and thus help in early reclamation of these lands.

At present all the drains will be kept open in the first season and the proposed closed drains or tile drains except in Survey No. 469 will be covered in rabi season. This will help to leach out maximum salts through the drain.

After close observations of the water table with the help of piezometers and visual observations, the observation data are analysed for further work.

The blocks No. 3 and No. 4 comprises of Survey Nos. 466, 467, 468 and 439/1, 469/2, 470 with an aggregate area of 140.02 acres.

Almost all the lands which have been affected either due to salinity or alkalinity are located towards the south-west part of village Nagansur.

The block has an outfall end in the nalla passing from east to west at the end portion of Survey Nos. 469, 470, 467 and 468.

The nalla course is bifurcated at the corner of Survey No. 469 and the original nalla course has changed its direction and the new water course, thus formed has completely eroded nearly 80 acres of land. The original nalla was 2,300 feet long and three feet wide whereas new nalla formed is having a length of 8,000 feet and breadth of 100 to 125 feet. Both the nallas along with the gullies have been silted up.

In block Nos. 3 and 4 there is an outside catchment of nearly 200 acres. The average rainfall for the past ten years ranges between 25 inches to 29 inches. Generally maximum rains are received in the month of August and first fortnight of September.

Observations on Salinity Status

The lands in Survey Nos. 466, 469/1, 469/2, 470 (Partial), 467 (half portion) have been damaged due to salinity. The white and brown incrustation is observed in almost all the lands. The land is hard to feel and these patches do not allow any plant growth.

Vegetation

Except the salt tolerant plants such as *babhul*, *tarvad*, *budakankasa*, *pisola*, *chikadkasa* and some stray patches of grass, no other crop thrives well in such salt affected patches. Crops such as *jowar*, wheat, safflower, linseed, groundnut and *tur* were tried but they have yielded very poorly. Due to salt formation, the seed does not germinate properly.

Drains are excavated with some trouble as the work was rather of typical nature and was new to labourers and also to the field staff. At the time of excavation of the drains, with the increase in depth the soggy and salty nature of soils did not allow the labourers to work for a longer time in the drains. They were feeling their mouths dry and saliva salty. Many of the labourers had to leave the job due to cough and cold. All the excavation work was carried out during the months of May and June. The water was struck in almost all drains at a depth varying from 2 feet to 5 feet.

In sub-main 2 and the main 1, layers of sand were observed below 1' and 1½ feet. Due to the sandy layers proper shape could not be given to the drains. Lime cankers (CaCo₃) with thickness of half an inch below 4 feet, in drains A to B within a length of 300' were observed.

The silted nalla course was deepened and widened with the help of the bulldozer. Also a plug for checking of water course-entering the old nalla was constructed at the end of the Survey number boundary of 469. The humps in Survey No. 468 were also demolished.

During the month of July due to heavy rains, the work of laying tiles in the proposed closed drains could not be completed, drains got silted upto a depth of 1' to 1½'.

The after effects of this rain were as under:—

1. Though no vegetation was observed in the plot near the well, *hariali* patches and some minor grasses were seen coming up.
2. The water table in the well practically reached the ground level.

3. Drains were functioning satisfactorily i. e. excess of water in the fields was drained out.

4. By the sides of the drains and by the sides of the bunds white incrustation was seen. This gave the idea of heavy saturation of soluble salts.

5. Heavy cracks in open drains were observed.

6. Due to high alkali status in many places the sides of drains became hard.

7. In Survey No. 470 at the end, only sand was observed in nalla bed. After opening the laterals from J to K (1,320 feet) and after functioning of drains white salt layer was accumulated over an area of $10' \times 10'$, is a clear indication that sufficient quantity of salts have been leached out by rains.

For the last eight years this land was practically lying fallow. This year due to leaching of some portion of salts, the cultivator could take crops such as groundnut, *tur-bajari* mixture, dhaincha, sunn-hemp, and paddy. Germination was quite satisfactory except in gully portions, where salts are accumulated. The general crop growth was satisfactory.

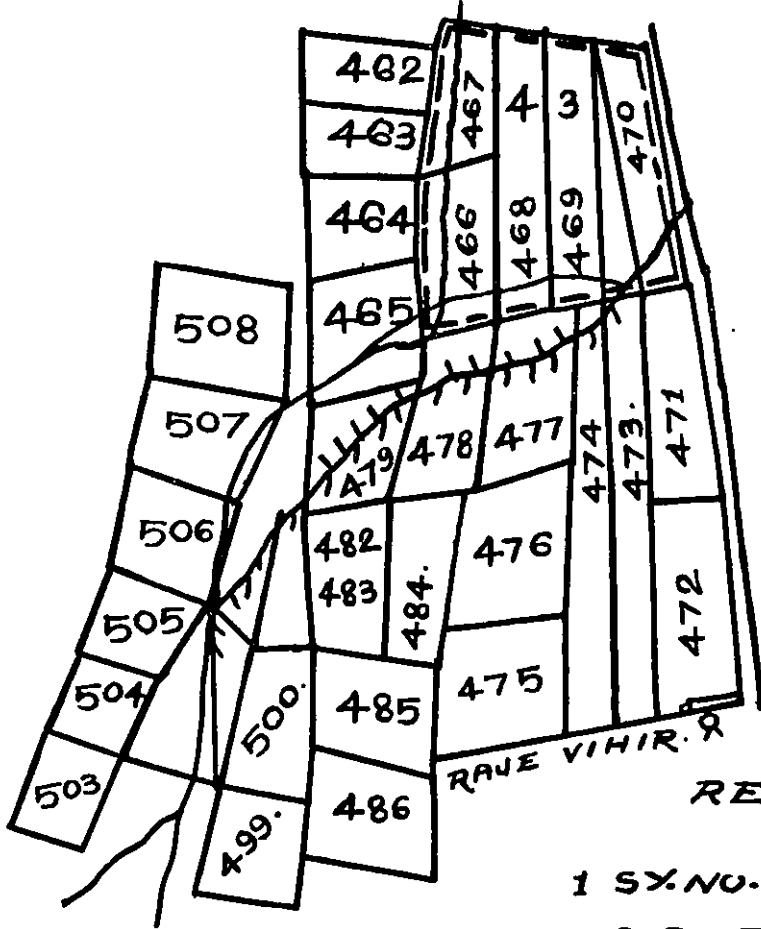
Due to silting, water stagnation was observed in different pockets. These barriers have been removed and water is taken off which otherwise would have affected on the functioning of drainage system.

In brief due to proper functioning of drains, excess water along with soluble salts is being drained off. This condition facilitated crop growth and the land which was fallow for the last eight years is now again brought under cultivation. Slowly with the leaching of salts, the soil would be normal and as productive as it was in the past, in the near future.

MAP SHOWING THE AFFECTED
SY. NOS. SURROUNDING
THE PRESENT ILL-DRAINED
AREA PROJECT AT.
NAGANSUR.



SCALE
1" = 1320'



REFERENCES.







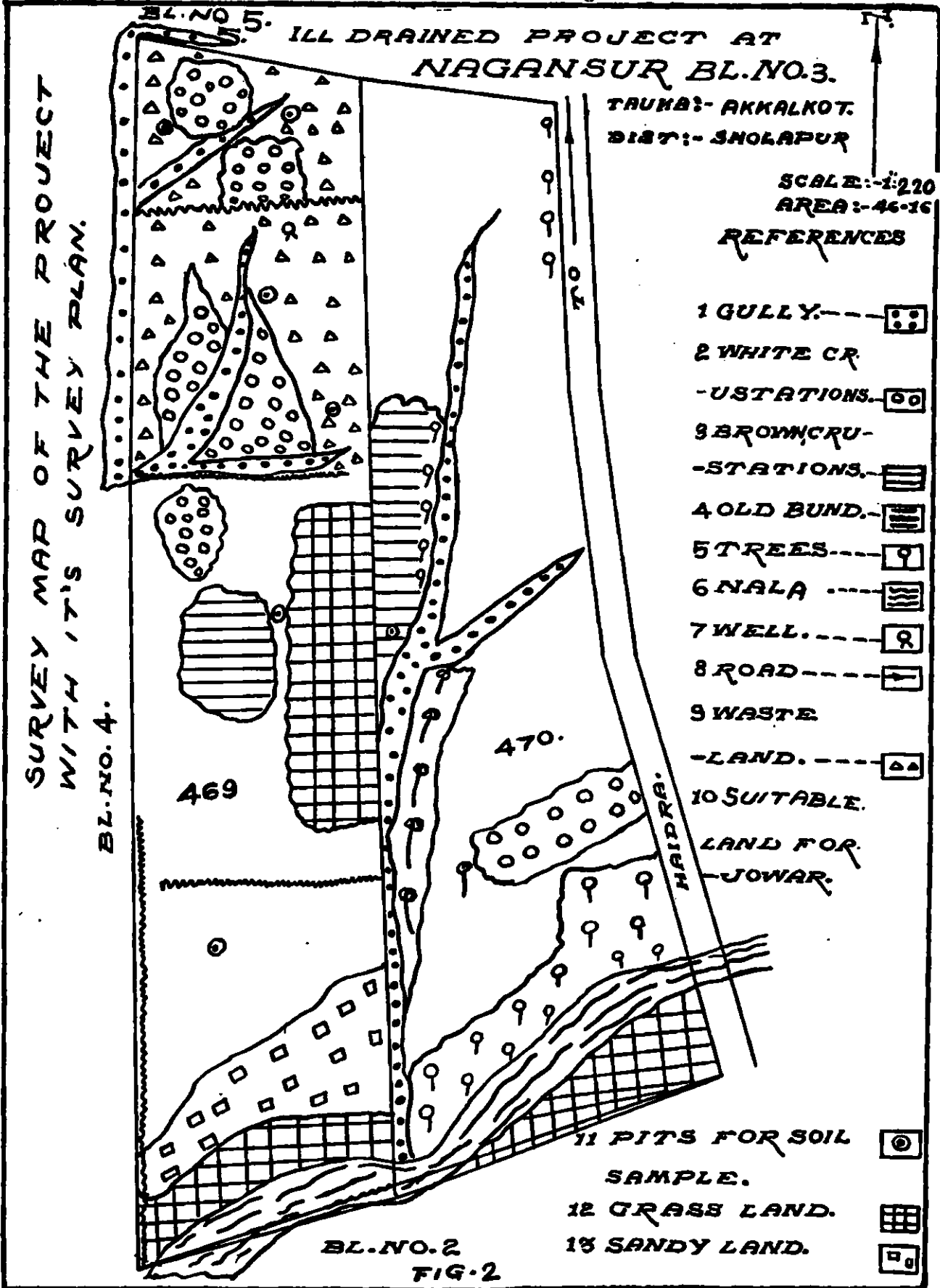
- 1 SY. NO. OF BLOCKS 
- 3 AND 4. — — 
- 2 NEW NALA. — — — 
- 3 OLD NALA. — — — 
- 4 GULLY. — — — 
- 5 WELL. — — — 

FIG. 1



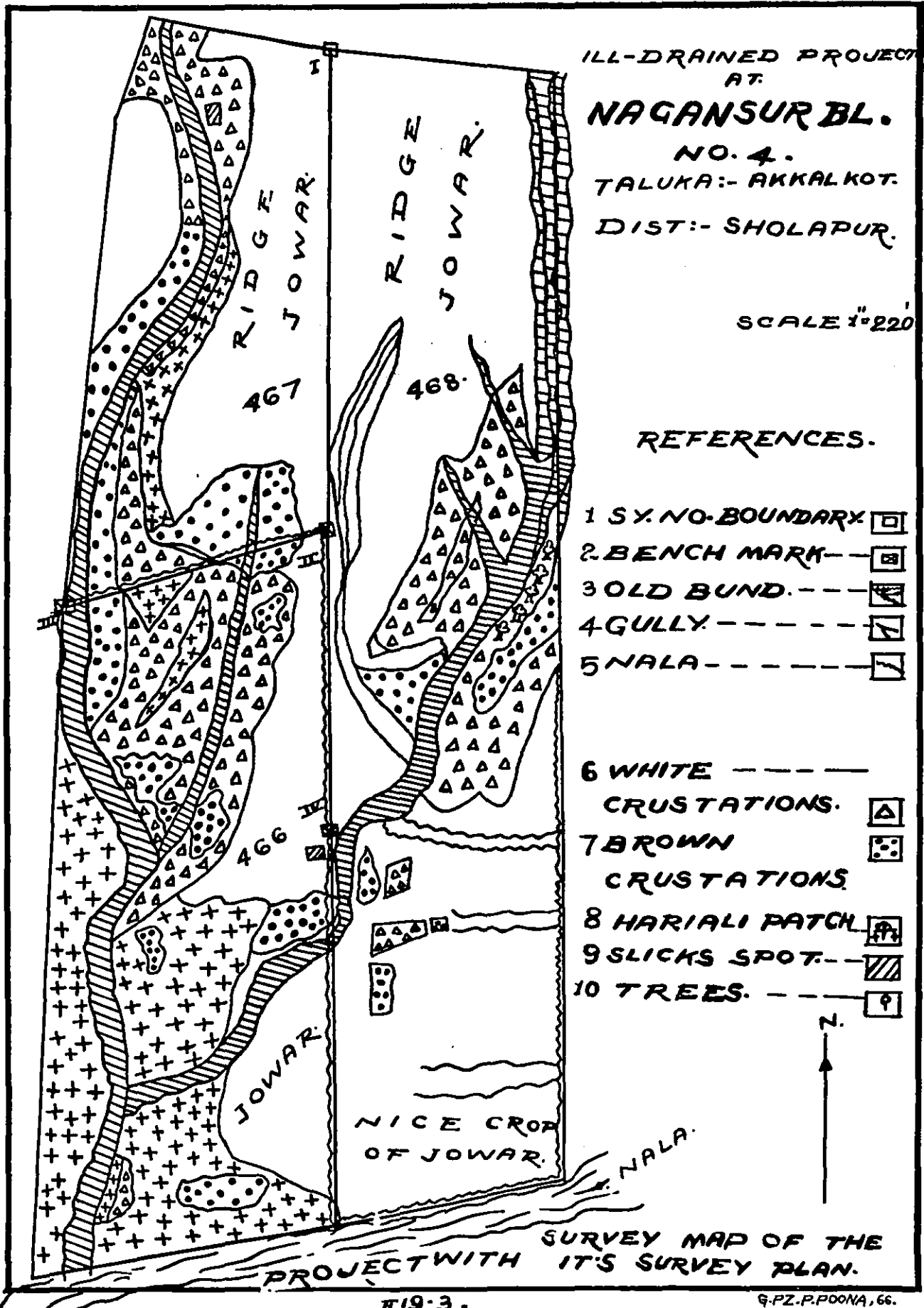
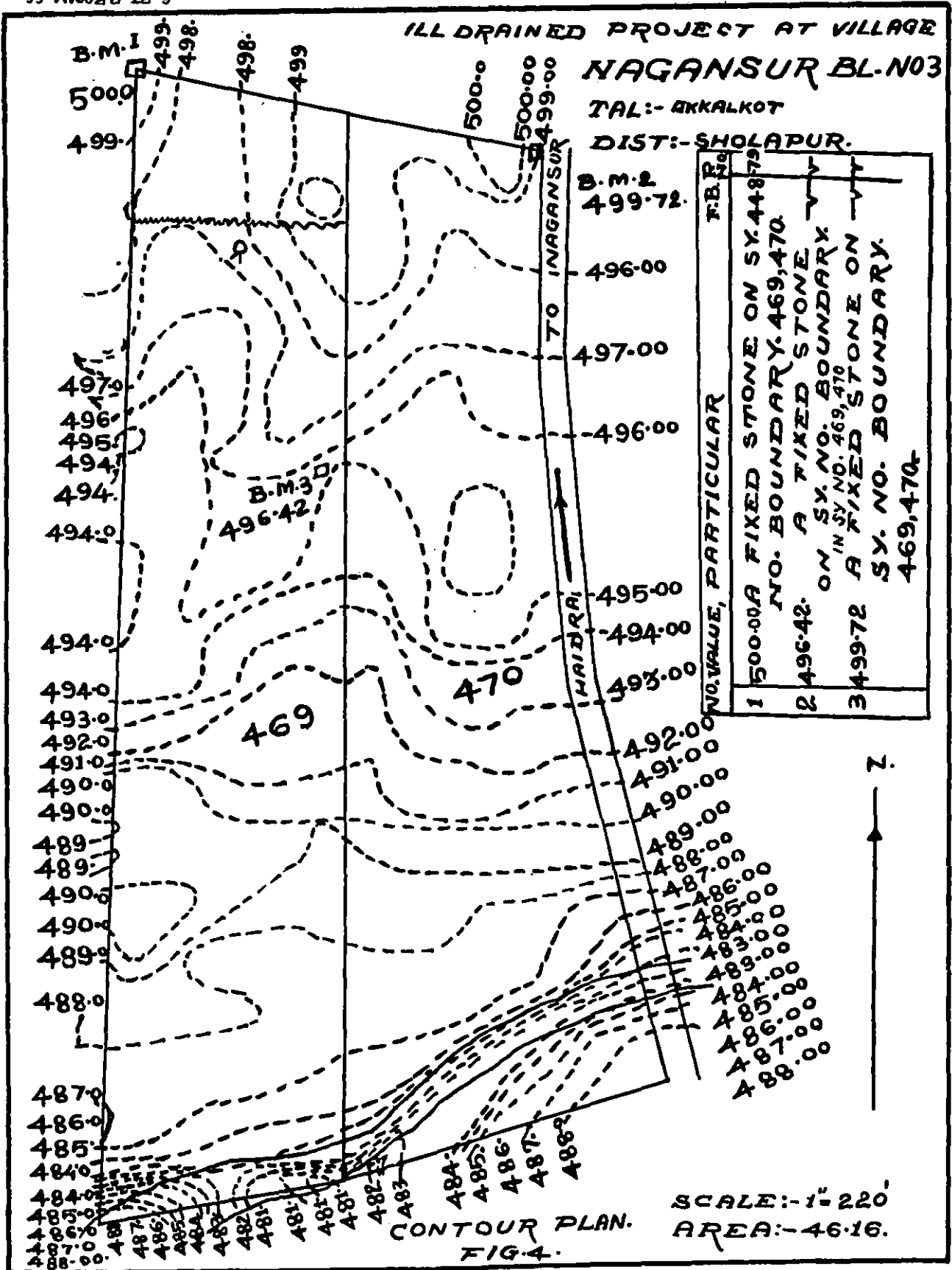
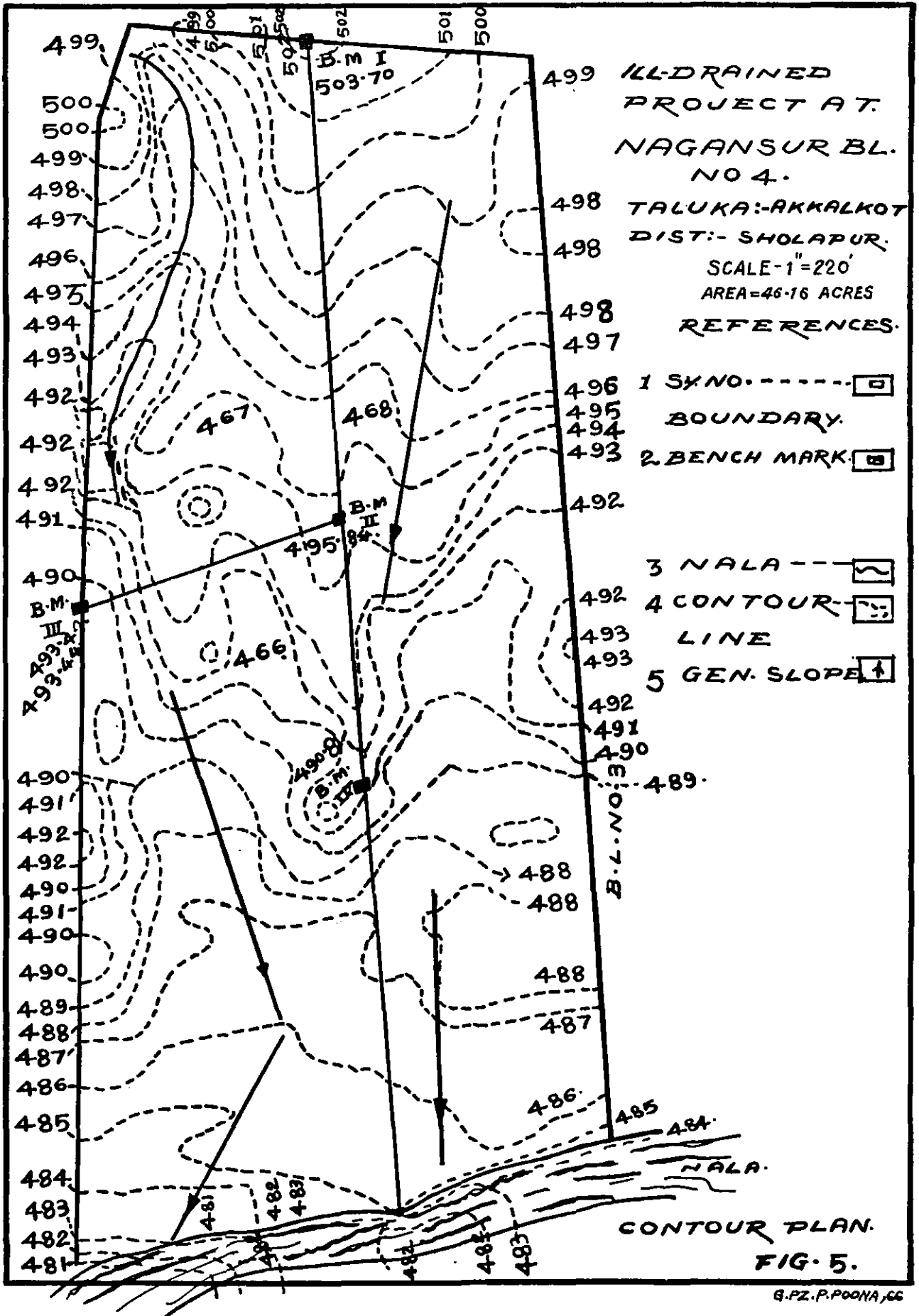


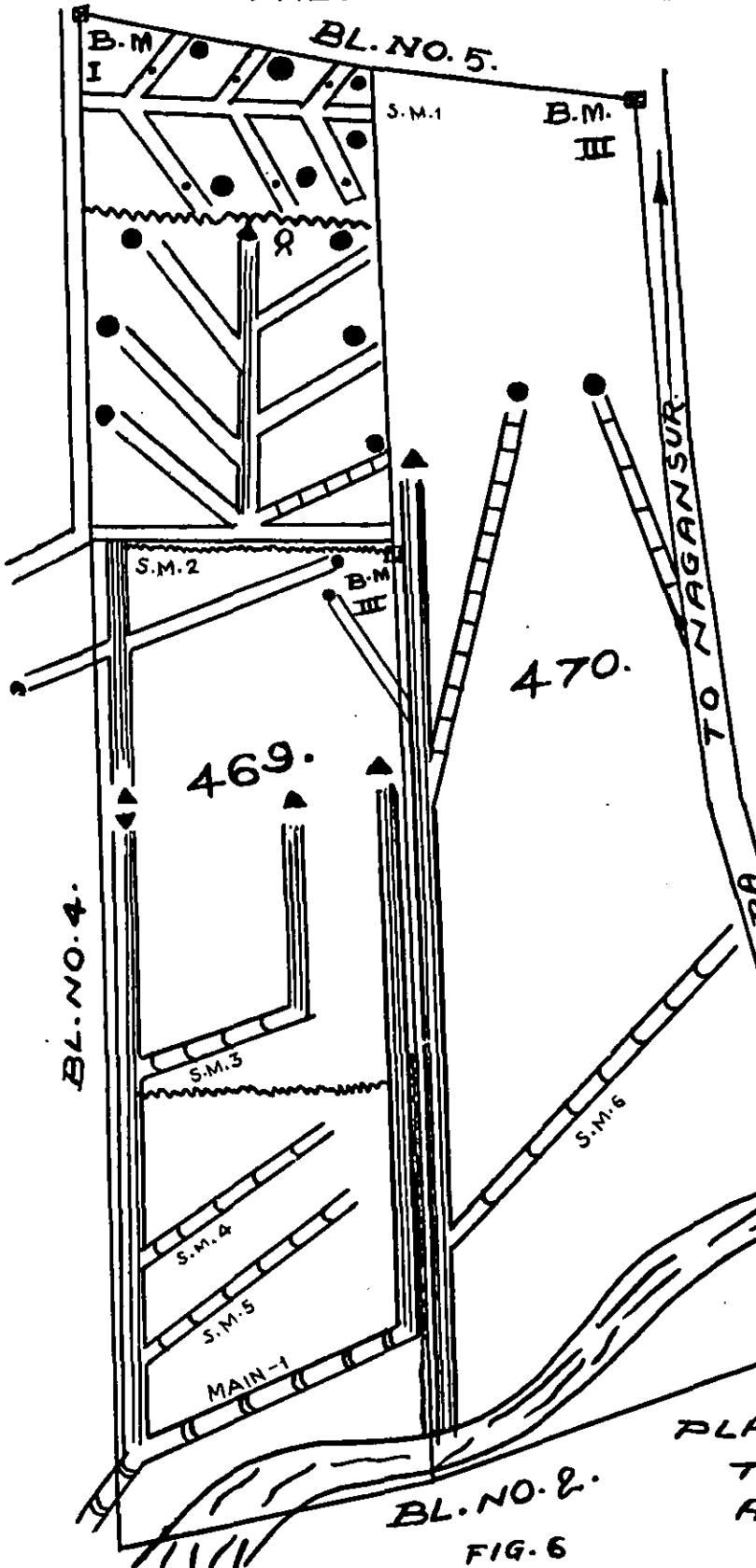
FIG-3.

9. PZ. P 00NA, 56





ILL-DRAINED PROJECT AT
NAGANSUR BL.NO.3
TAL: AKKALKOT - DIST:-SHOLAPUR.



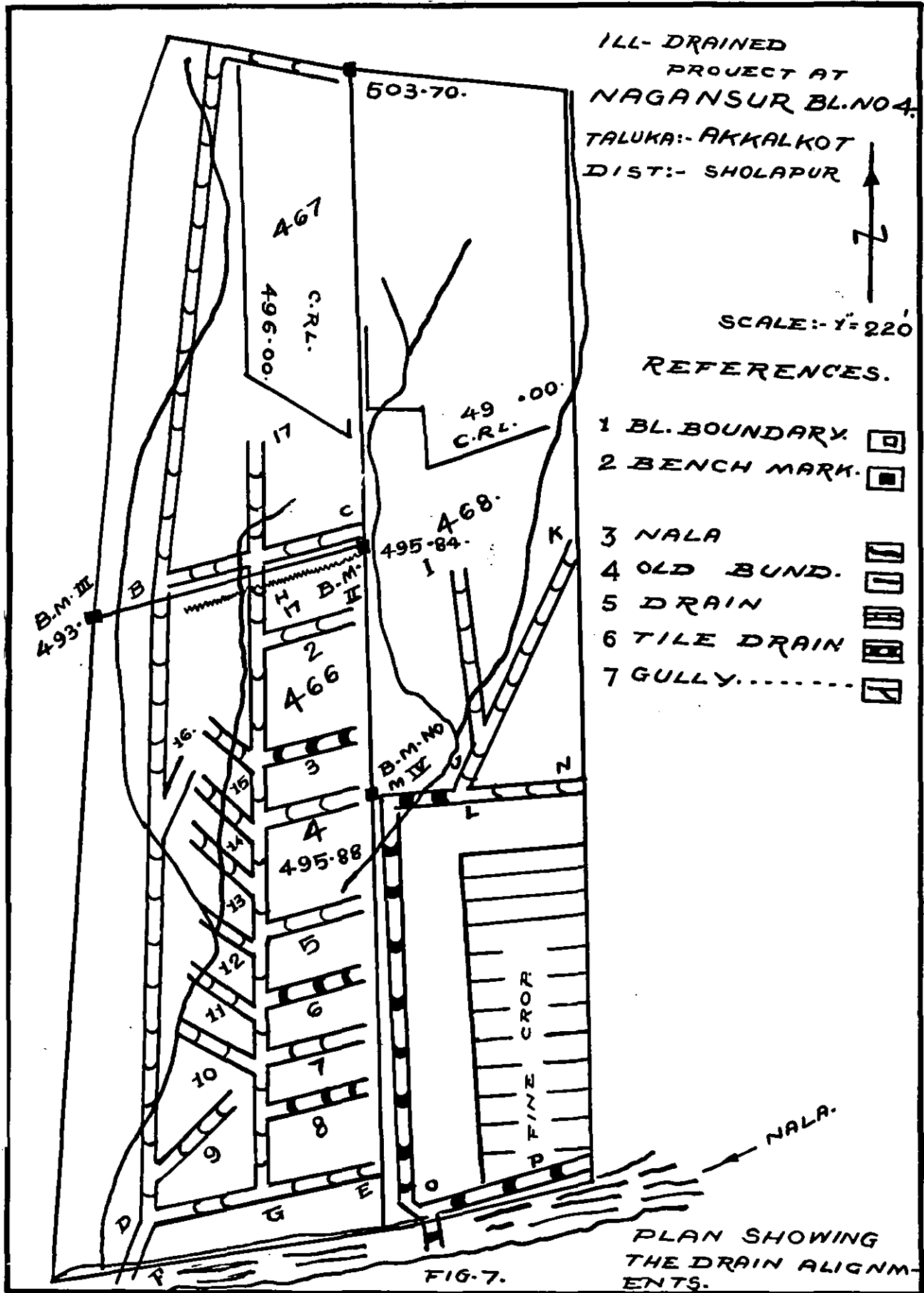
SCALE:-1"= 220'
AREA:-46.16.

REFERENCES.

- 1 BLOCK---[Symbol]
- BOUNDARY
- 2 SY. NO.---[Symbol]
- BOUNDARY.
- 3 BENCH---[Symbol]
- MARK
- 4 OLD BUND [Symbol]
- 5 WELL---[Symbol]
- 6 ROAD---[Symbol]
- 7 NALA---[Symbol]
- 8 TILE---[Symbol]
- DRAIN.
- 9 MAIN-1---[Symbol]
- 10 SUB MAIN [Symbol]
- 1 TO 6.
- 11 LATERAL [Symbol]
- 1 TO 6.
- 12 SUB LATERAL [Symbol]

PLAN SHOWING.
THE DRAIN
ALIGNMENTS,

FIG. 6



DETAILS OF MAINS, SUB-MAINS, LATERALS
AND SUB - LATERALS.

NAGANSUR BL.NO.3.

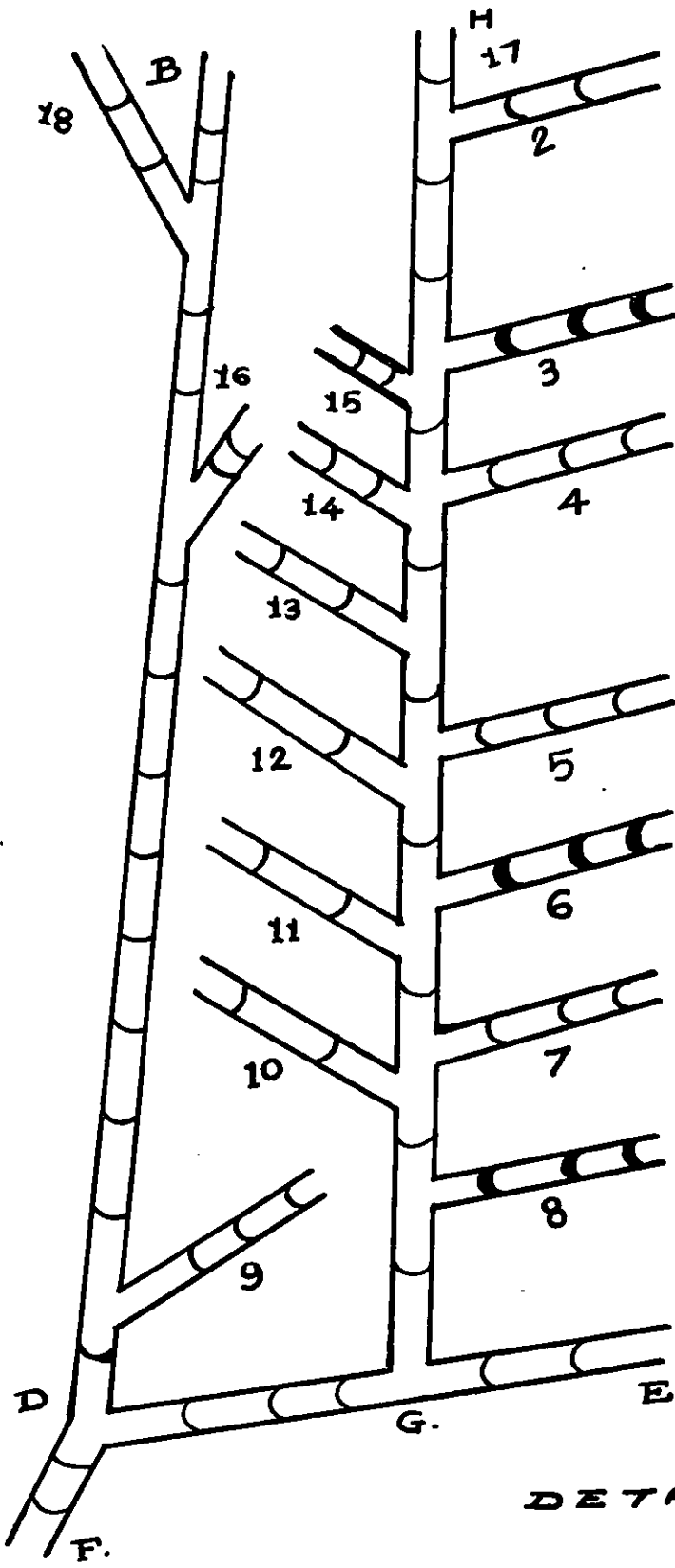
SR. NO	SY. NO.	NAME OF DRAIN	LENG-TH.	SECTI-ON INS&FT.	SIDE SLOP. E.	T	B.	H.	BED SLOP. E.	LEVELS	
										INLET -T.	OUTLET -T.
1	469/1	SUB MAIN	417'	1800	1:1.34	10	2	3	0.20%	7.22	8.05
2	"	SUB LAT-	96'	14'00	1:1.50	7	"	"	"	7.60	7.79
3	"	ERAL. 1	136'	"	"	"	"	"	"	7.25	7.52
4	"	" 2	103'	"	"	"	"	"	"	6.49	6.60
5	"	" 3	124'	"	"	"	"	"	"	6.77	7.02
6	"	" 4	93'	"	"	"	"	"	"	7.61	7.80
7	"	" 5	136'	"	"	"	"	"	"	7.65	7.92
8	"	" 6	236'	"	"	"	"	"	"	9.51	10.01
9	"	" 7	105'	"	"	"	"	"	"	10.07	10.28
10	"	" 8	164'	"	"	"	"	"	"	11.37	11.70
11	"	" 9	195'	"	"	"	"	"	"	10.90	11.29
12	"	" 10	190'	"	"	"	"	"	"	10.30	10.68
13	"	" 11	247'	"	"	"	"	"	"	9.73	10.22
14	"	" 12	317'	"	"	"	"	"	"	12.64	13.27
15	"	" 13	135'	"	"	"	"	"	"	9.72	9.99
16	470	" 14	349'	"	"	"	"	"	"	7.45	8.15
17	"	" 15	553'	"	"	"	"	"	"	8.02	9.03
18	469/1	SUB MAIN 2	376'	1800	1:1.34	10	"	"	"	7.20	7.95
19	469/2	" 3	255'	1800	"	"	"	"	"	7.22	7.73
20	"	" 4	442'	"	"	"	"	"	"	7.35	8.23
21	"	" 5	401'	"	"	"	"	"	"	6.49	7.29
22	470	" 6	606'	"	"	"	"	"	"	5.40	6.61
23	469/1	LATERAL 1	435'	"	"	"	"	"	"	6.35	7.22
24	"	" 2	153'	"	"	"	"	"	"	7.25	7.56
25	"	" 3	157'	"	"	"	"	"	"	7.25	7.50
26	"	" 4	1100'	"	"	"	"	"	"	8.10	7.50
27	"	" 5	246'	"	"	"	"	"	"	6.49	10.30
28	470	" 6	757'	"	"	"	"	"	"	7.22	6.98
29	469/2	MAIN	1412'	"	"	"	"	"	"	8.48	8.73
			442'	"	"	"	"	"	"	6.50	11.30
											7.38

FIG. 8

DETAILS OF MAINS, SUB MAINS,
LATERALS, SUB-LATERALS.
NAGANSUR BL. NO. 4.

SY. NO.	S.R.N. OF DRAIN.	LENGTH	NAM-SECTION OF DRAIN	SECT-ION IN SQ FT.	T.	B.	H.	BE. D. SLOPE	SIDE SLOPE.
466	1	192	SUB	1400	9.50	2	2.50	3%	1:1 1/2
"	2	192	LATE-	"	"	"	"	"	"
"	4	220	RAL.	"	"	"	"	"	"
"	5	245	"	"	"	"	"	"	"
"	7	220	"	"	"	"	"	"	"
"	10	220	"	"	"	"	"	"	"
"	11	192	"	"	"	"	"	"	"
"	12	275	"	"	"	"	"	"	"
"	13	220	"	"	"	"	"	"	"
"	14	165	"	"	"	"	"	"	"
"	15	137	"	"	"	"	"	"	"
"	16	165	"	"	"	"	"	"	"
"	17	245	"	"	"	"	"	"	"
"	3	190	CLOSE	1800	10.75	2.50	2.75	"	1:2
"	6	220	D-D-	1800	"	"	"	"	"
"	8	220	RAIN.	1800	"	"	"	"	"
"	B-D	1265	LAT	3600	18	6	3	"	"
"	D-F	220	ERAL.	3600	"	6	3	"	"
"	H-C	1265	"	2400	13.50	3	3	"	1:1 1/4
467	A-B	1155	SUB	3600	18	6	2.50	"	1:2
"	C-B	412	MAIN.	1400	9.50	2	"	"	1:1 1/2
"	17	245	SUB	1400	"	2	2.75	"	"
468	I-J.	375	LATE	1800	10.75	2	3	"	1:2
"	K-L.	1457	RAL.	3000	16.00	4	2.50	"	1:2.
"	M-O.	275	CLOS-	1400	9.50	2	2.50	"	1:1 1/2
"	N-L	220	ED.D.	1800	10.75	2.50	2.75	"	1:2.
"	E-C	195	SUB	1800	"	2.50	2.75	"	"
"	P-O.		MAIN						
FIG. 9.									

SY. NO
466



DETAILS ON NEXT
PAGE.

FIG-10

SY. NO. 466. NAGANSUR
BL. NO. 4.

Sr. No.	SUB MAIN	LATERAL	SUB LATERAL	T.	B.	H.	SIDE SLOPE	LENGTH	SECTION.
1	—	—	1	9.50	2	2.50	1:1/2%	192	1400
2	—	—	2	"	"	"	"	192	"
3	—	—	4	"	"	"	"	220	"
4	—	—	5	"	"	"	"	245	"
5	—	—	7	"	"	"	"	220	"
6	—	—	10	"	"	"	"	220	"
7	—	—	11	"	"	"	"	192	"
8	—	—	12	"	"	"	"	275	"
9	—	—	13	"	"	"	"	220	"
10	—	—	14	"	"	"	"	165	"
11	—	—	15	"	"	"	"	137	"
12	—	—	16	"	"	"	"	165	"
13	—	—	17	"	"	"	"	245	"

CLOSED DRAINS

14	—	—	3	10.75	2.50	2.75	1:2	190	1800
15	—	—	6	"	"	"	"	220	1800
16	—	—	8	"	"	"	"	220	1800
17	—	B TO D	—	18	6	3	"	1265	3600
18	—	D TO E	—	"	6	"	"	220	3600
19	—	H TO C	—	13.50	3	"	1:1/2	1265	2400.
20	—								

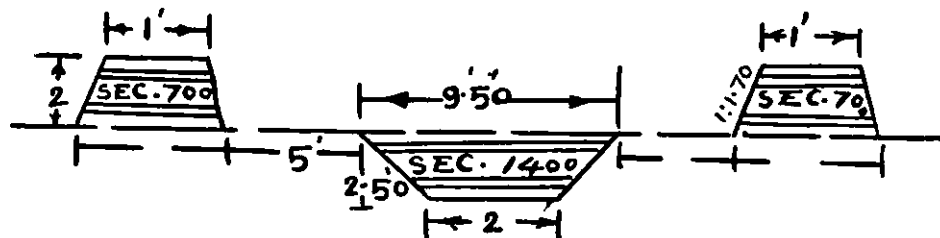
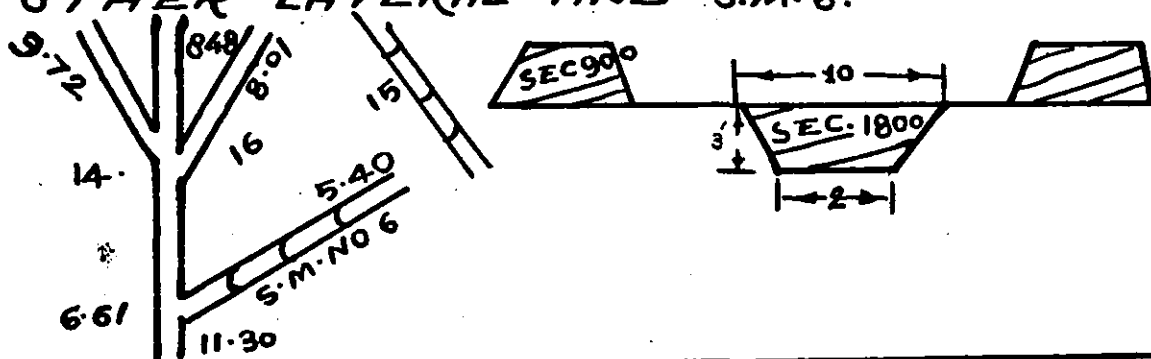


FIG. 11

NAGANSUR BL. NO. 3.

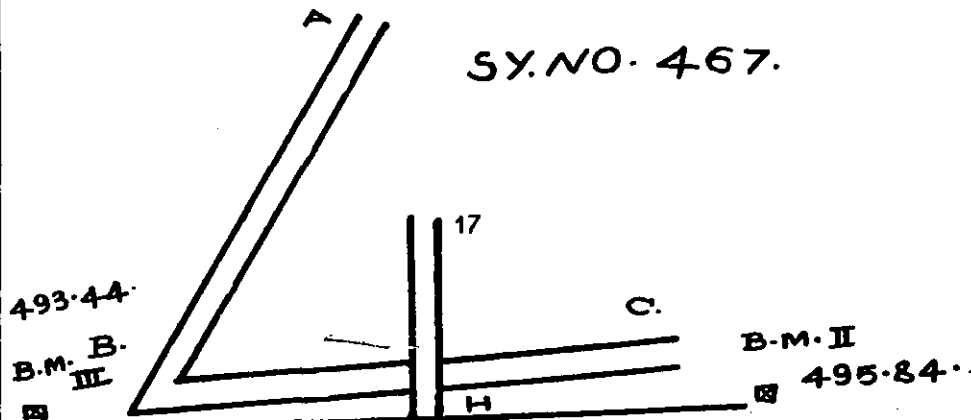
SY. NO. 470.

DETAILS OF LATERAL J TO K. AND
OTHER LATERAL AND S.M. 6.



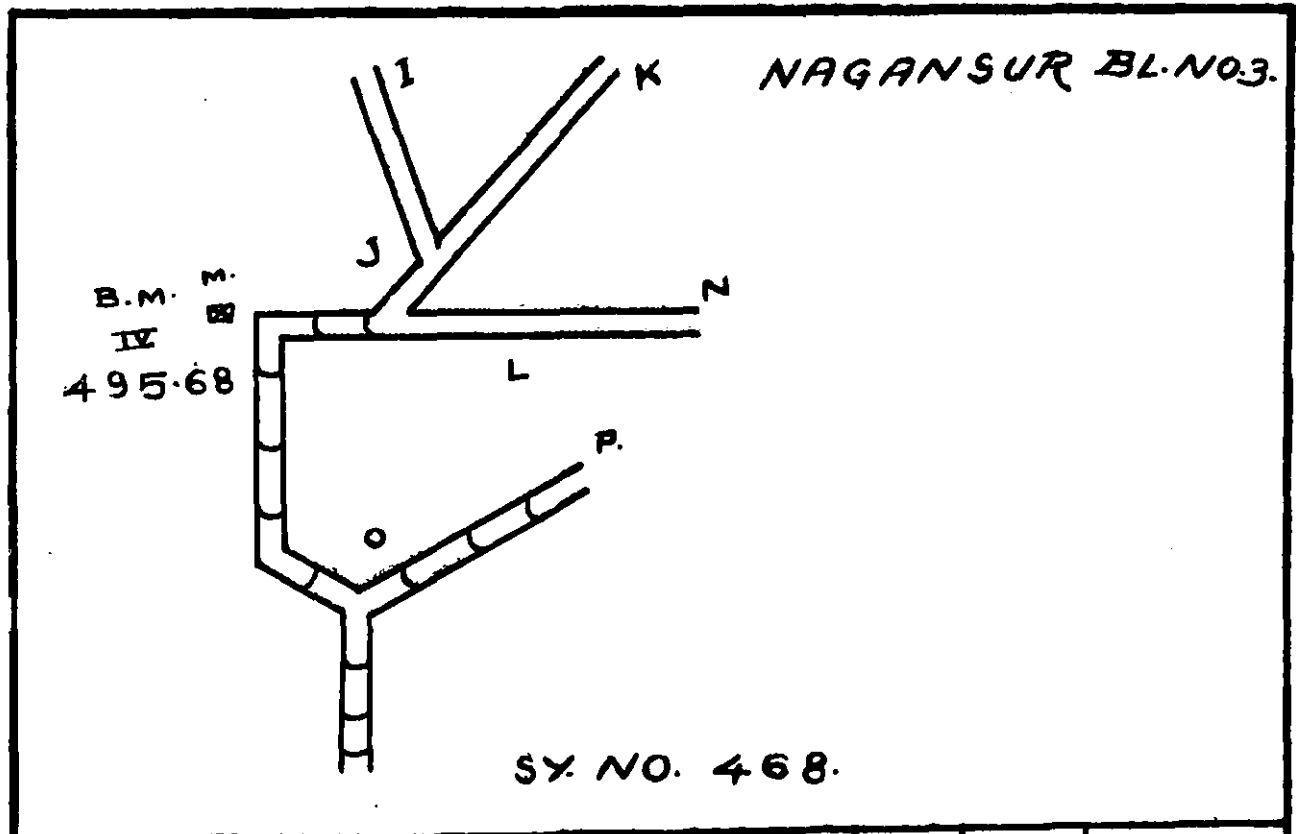
N.	NAME OF DRAIN.	LENG. TH.	SEC. TION	SIDE SLOPE	T	B	H.	GRA. DE.	LEVELS.	
									INLET	OUTLET.
14	LATERAL	135	14'	1:1.50	7	2	3	2%	9.72	9.99
15	"	349	"	"	7	2	3	"	7.45	8.15
16	"	553	"	"	7	2	3	"	8.02	9.03
6	SUB.M.	606	18'	1:1.34	10	2	3	"	5.40	6.61
	J.K. LATERAL	1412	"	"	10	2	3	"	8.48	11.30.

SY. NO. 467.



SR. NO.	SUB MAIN.	SUB LATERAL	LATERAL	T	B.	H.	SIDE SLOPE	LENGTH.	SECT.
1	C TO B.	-	A TO B.	18	6	3	1:2	1155	3600
2	-	-	-	9.50	2	2.50	1:1 1/2	412	1400
3	-	17	-	9.50	2	2.50	"	245	1400.

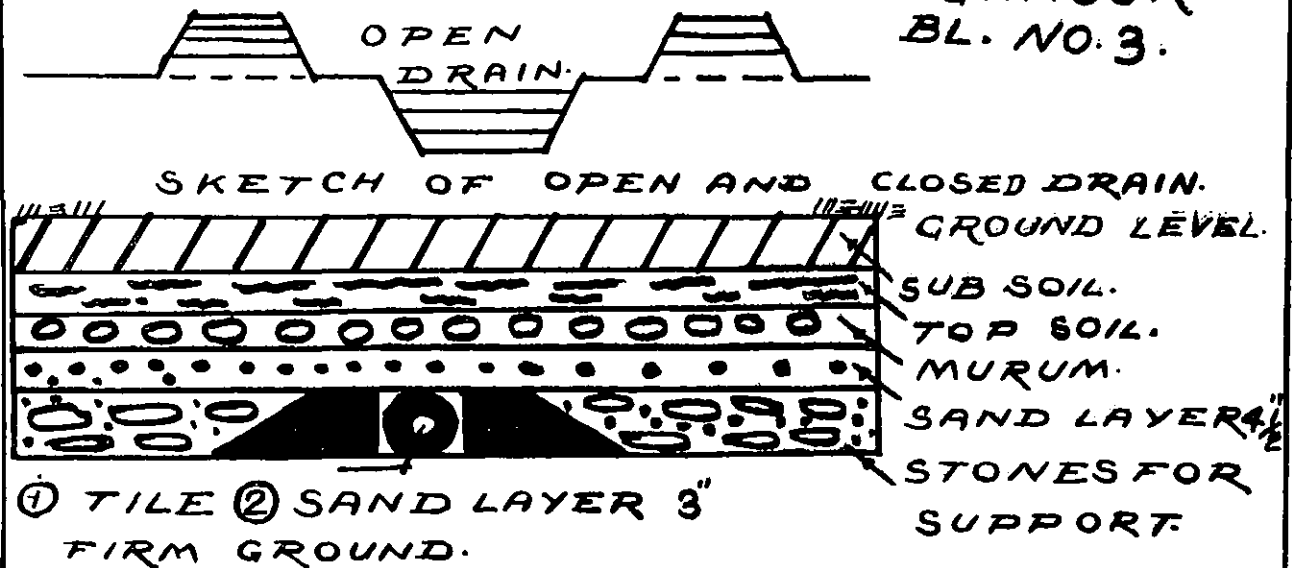
FIG. 12.A



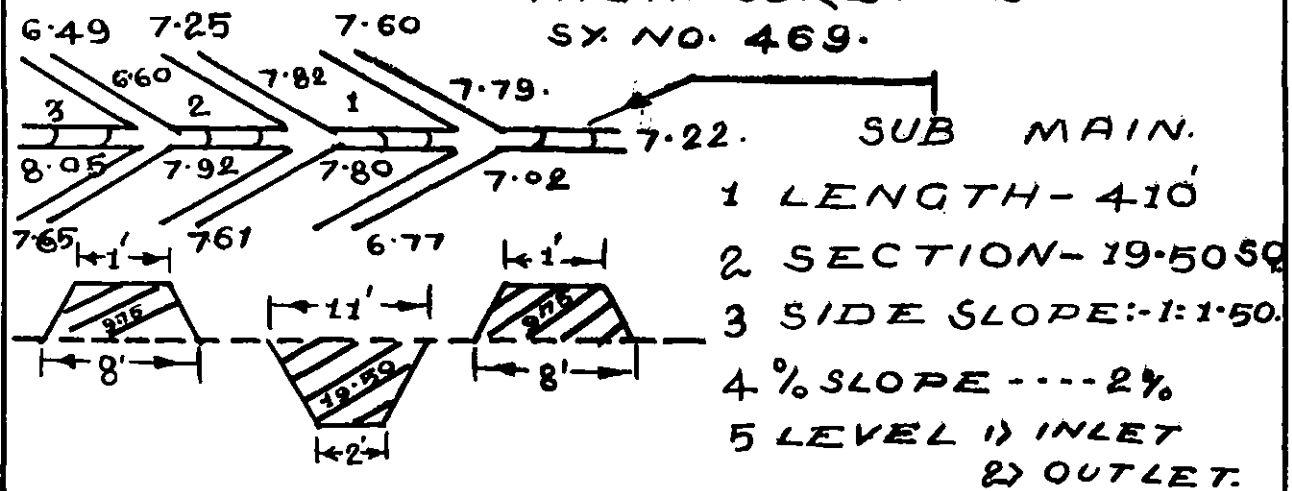
Sr. No.	SUB MAIN.	SUB LATERAL.	T.	B.	H.	SIDE SLOP E.	LEN. GTH.	LAT. ERAL.	SECTION.
1	-	-	10.75	2.	2.75	1:2	375	I TO U	1800
2	-	-	16.00	4.	3	"	1457	K-LMO	3000
3	-	-	9.50	2.	2.50	1:1 1/2	275	N TO L	1400
4	P-O	-	10.75.	2.50	2.75	1:2	195.	-	1800

FIG. 12. B.

NAGANSUR
BL. NO. 3.



NAGANSUR BL. NO. 3.
SY. NO. 469.

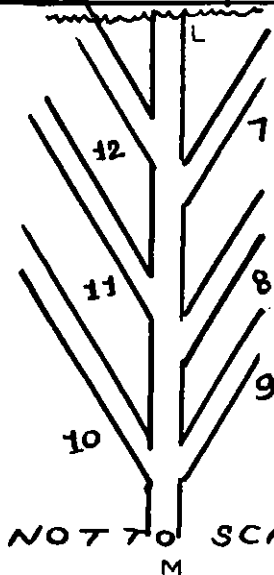


SR. NO.	LENGTH	SECTIO. - N.	SIDE SLOPE.	BED % SLOPE.	LEVELS.	
					INLET	OUTLET
1	96'	14 00	1:1.50	2%	7.60	7.79.
2	95'	DO	DO	"	7.25	7.52.
3	105	DO	DO	"	6.49	6.60.
4	138 1/2	DO	DO	"	6.77	7.02.
5	139'	DO	DO	"	7.61	7.80
6	127'	DO	DO	"	7.65	7.92.

FIG 13. A

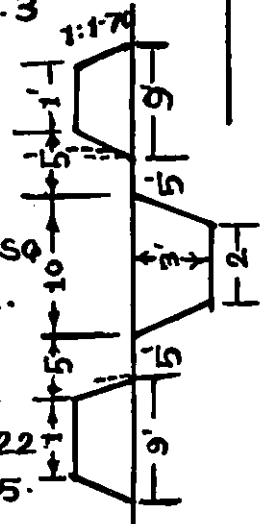
NAGANSUR BL. NO. 3.
 DETAILS OF SUB-LATERALS.

SR. NO.	LENGTH.	SECTION IN SQ. FT.	SIDE SLOPE	% SLOPE.	LEVELS	
					INLET	OUTLET
7	146 1/2'	1400	1:1.34	0.2%	9.51	10.01
8	188	— DO —	— DO —	— DO —		
9	163 1/2'	— DO —	— DO —	— DO —	10.07	10.28
10	203'	— DO —	— DO —	— DO —	11.37	11.70
11	197'	— DO —	— DO —	— DO —	10.90	11.29.
12	223 1/2'	— DO —	— DO —	— DO —	10.30	10.68.
L.M.	435.	— 18 —	— DO —	— DO —	9.73	10.22.
					6.35.	7.22.



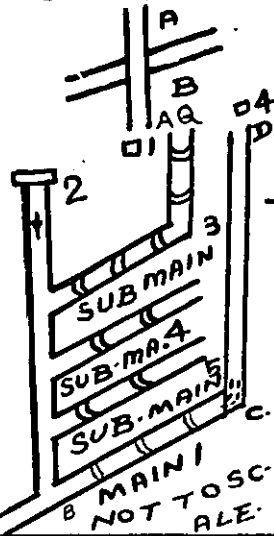
NAGANSUR BL. NO. 3
 SY. NO 469.
 SUB MAIN 2

- 1 LENGTH ----- 282'
- 2 SECTION 18.00 SQ.
- 3 SIDESLOPE 1:1.34.
- 4 BED SLOPE 2%
- 5 LEVELS INLET 6.35.
 AT, LATERAL } OUTLET 7.22
 L TO, M. } 435.



SECTION AND DETAILS (OTHER) SAME AS ABOVE.

DETAILS.



MAINS, SUB MAINS, LATERALS & SUB-L.

SR. N.	NAME OF DRAIN.	SECT. IN SQ.	SIDE SLOPE	LENGTH	TOP	B.	T.	SLOPE	LEVELS	
									INLET	OUTLET
1	MAIN	1800	1:1.34	442'	10	2	3	2%	6.50	7.58
2	SUB-MAIN	1400	1:1.50	255'	9.50	2			7.22	7.73
3	"	"	"	442'	9.50	2	25	"	7.35	8.23
4	"	"	"	401'	9.50	"	25	"	6.49	7.29
5	A TO LAT.	"	"	310'	"	"	"	"	7.25	7.56
6	ERAL.	"	"	1100	"	"	"	"	8.16	10.30
7	AB	"	"	246'	"	"	"	"	6.49	6.98
8	E.F.	"	"	757'	10	2	3	"	7.22	8.73
9	D.C.	1800	1:1.94							
	SUB-LAT.	1400	1:1.50	317'	9.50	2	25	"	7.22	7.73

FIG 13 B.

ILL-DRAINED SOILS AT VILLAGE AGALGAON, TALUKA BARSHI, DISTRICT SHOLAPUR

Introduction

The lands at Agalgaon Block No. 23 comprises of Survey Nos. 204, 206, 207, 208, 209 and 210 and is having an area of 55.31 acres. Out of this acreage, 16 acres, having soil type shallow to medium, have been heavily affected due to ill-drainage. The soils in low-lying portion are deep with soil depth varying from 18 inch to 5 feet. The soils on eastern side of main nalla are shallow. The texture of the soil on an average is clayey loam. At lower levels, near the nalla, it is clayey. The soils have not yet developed salinity or alkalinity. The tendency of the soil towards cracking develops from February to March. The cracking is profuse. The width of the crack at times extends upto 2 feet. Ploughing is not possible after March. However, in paddy area, ploughing is possible in the month of January. The nalla is on the western side of the problematic area and there is unbunded area on the northern side. Southern and eastern parts as well as south-west corner have been banded. The nalla was previously flowing through Survey No. 203. The owner changed the direction of the nalla course by constructing an earthen bund. The nalla course is now passing through Survey No. 171. Due to a well in Survey No. 171 and its over flow, it created water-logging conditions. These conditions are prevailing since last 20 to 25 years. Due to water-logging, cultivators of this area had to give up the cultivation.

A site plan of the project having the position of nallas, old and new wells and affected area is shown in figure appended herewith.

The Problem

The problem is to reclaim the lands which have become water-logged due to change of nalla course. Due to water-logging, the water-table has risen upto the surface zone.

The Vegetation

Salt and water loving plants such as *bhui erand*, *lavala*, *pura*, *kena*, *bavacha*, grow profusely where the lands are water-logged. Due to ill-drainage no crop could be successfully grown in the affected area. Cultivators, however, make attempts to grow crops in some parts, hoping to get some yield if favourable conditions occur.

For the last three years paddy is being grown in Survey Nos. 204 and 207. If favourable conditions occur for interculturing and weeding, they get somewhat good yields, not more than 2-3 bags per acre.

Other crops were tried, but could not thrive successfully.

Jowar could be taken in *rabi* season, but it could yield only, 96 kg. per acre on an average as against the local average of 860 kg per acre. Once in 1952-53 which was a famine year, a remarkably satisfactory yield to the tune of 15 bags per acre was obtained. Due to moderate soil moisture in that year the crop growth of *jowar* was very vigorous. This shows the productive potential capacity of the soil. The present practice of the cultivators is to grow crops in patches where there is less trouble and many cultivators grow paddy and sugarcane crops which sustain comparatively high soil moisture contents.

The reclamation of the soils thus affected comprises of two-fold activities, viz. (1) Mechanical and Cultural.

The reclamation by mechanical measures is considered cheaper and advantageous.

Method of Improvement

A close survey with a grid of 1 cm=15 metres was first taken and all the details regarding ridge and valley lines, vegetation, natural nalla course, crop growth etc., were marked on the survey map.

Soil samples from one foot layer and further from two feet depth were collected for soil analysis. Soil pits for horizon studies were also taken and close observations of the soil profiles were recorded.

Results of the soil analysis indicated that pH at the lower depths was from 8.3 to 8.4 and less in the upper layers. The percentage of total soluble salts ranged from 0.25 to 0.44.

While designing the drains and their sections, area of the upper catchments and the position of nalla course were considered. Plans and estimates were got approved on 5th June 1965.

Closed drains are mainly proposed in the cultivated area and open drains on the boundary lines of the affected part. All these drains finally open in the nalla course.

The water-table before the onset of mansson was 7 to 8 feet below ground level. The average rainfall of the tract is 27 inches. The ill-drained condition becomes more critical after the receipt of rains in the months of August and September.

The work of excavating the drains was actually started on 23rd April 1965. The drains are as under:—

1. Drain Nos. 3, 4 and 8 are kept open for the disposal of seepage from wells.
2. Series of parallel tile drains are excavated in the ill-drained area, all leading into the nalla.
3. Provision of the contour bunding was made for the unaffected part.
4. Provision of man-holes and drop structures is made where it is deemed necessary.
5. Alongwith this work the nalla was straightened and deepened wherever it was necessary by removing the curves and deepening the exposed bed rock upto a depth of about three feet. Due to this nalla training additional land of two acres is brought under cultivation.
6. Tile drains are constructed with four inch tile aligned on 0.3 per cent clearance of 1.5 feet at the outfall end.
7. Manholes are constructed for drain Nos. 5 and 6 in Khandaki with cement pointing. Outlet of the manhole was kept at 1 foot above bottom for accumulation of silt.
8. Outfall ends of open drains at the nalla bank are covered with stone pitching. Similarly those of tile drains were constructed in masonry.

The work was completed by the end of July 1965. After observation heavy rains were received on the 30th June, 1965.

The results were observed as follows:—

1. Within two hours, the nalla was flooded due to water received from outside catchment with an average depth of two feet. The flow was continuous.
2. Tile drain No. 5 and open drains Nos. 3, 4 and 8 were observed flowing for the first time on the 19th August 1965.
3. Tile drains Nos. 1, 2, 6 and 7 were found flowing on the 24th August 1965.

4. Tile drain No. 2 which was provided specially for draining the seepage and overflow from well No. 3 in Survey No. 204 was found to be quite effective in lowering water level of the well considerably.

5. To study the sub-soil water behaviour, 168 piezo-meters had been installed for all the open and closed drains.

6. Upto 21st August 1965 no water was observed indicating the water-table depth below $3\frac{1}{2}$ feet.

7. During Kharif season (1965-66) crops like *mug*, paddy, maize, and turmeric have been tried and all those crops were having quite normal growth during their life period.

Dhaincha was sown on the spoiled banks of the open drains.

Second crop of *rabi jowar* was proposed to be taken after *mug* crop.

Recording of further observations is continued. From these observations it could be very well seen that the lands which have become uncultivable due to water-logging, salinity or alkalinity can be improved and turned cultivable by adopting reclamation measures as enumerated above.

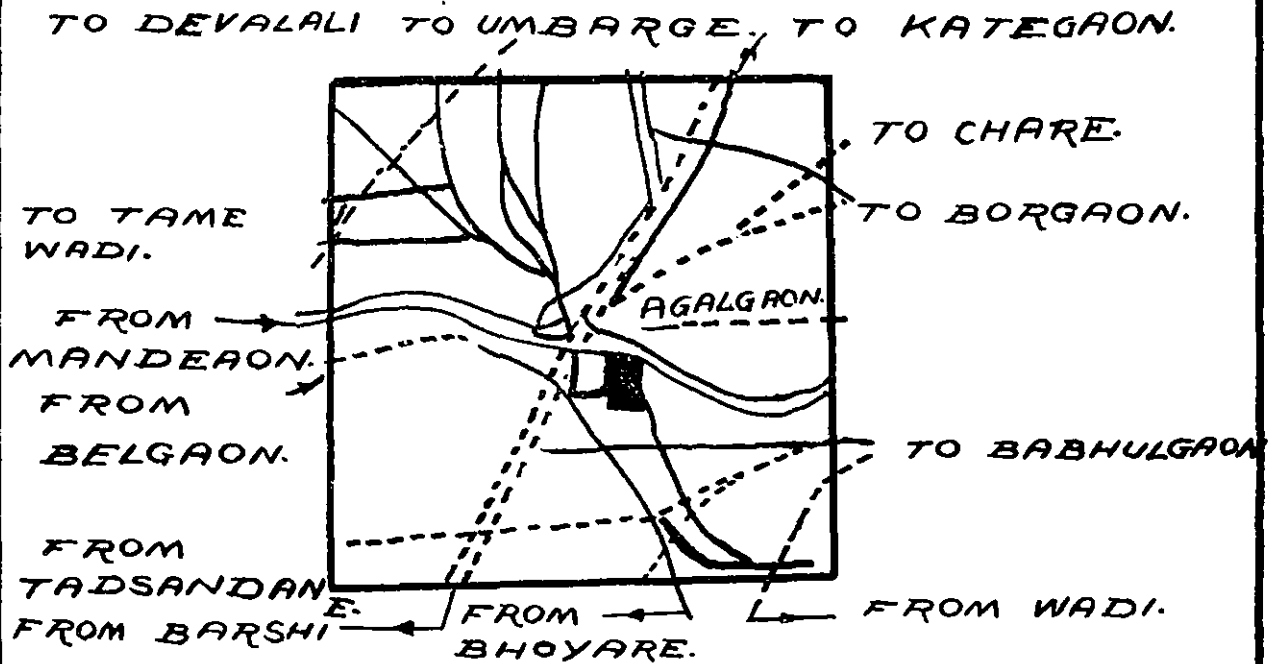
SITE PLAN OF VILLAGE
AGALGAON BL. NO. 23.

TALUKA :- BARSHI

DIST :- SHOLAPUR.

N.

SCALE :- 1" = 1 MILE



REFERENCES.








- 1 VILLAGE/ BOUNDARY 
- 2 ROAD 
- 3 CART TRACT. 
- 4 RIVER 
- 5 GULLY. 
- 6 FOOT PATH. 
- 7 SITE OF BLOCK: 

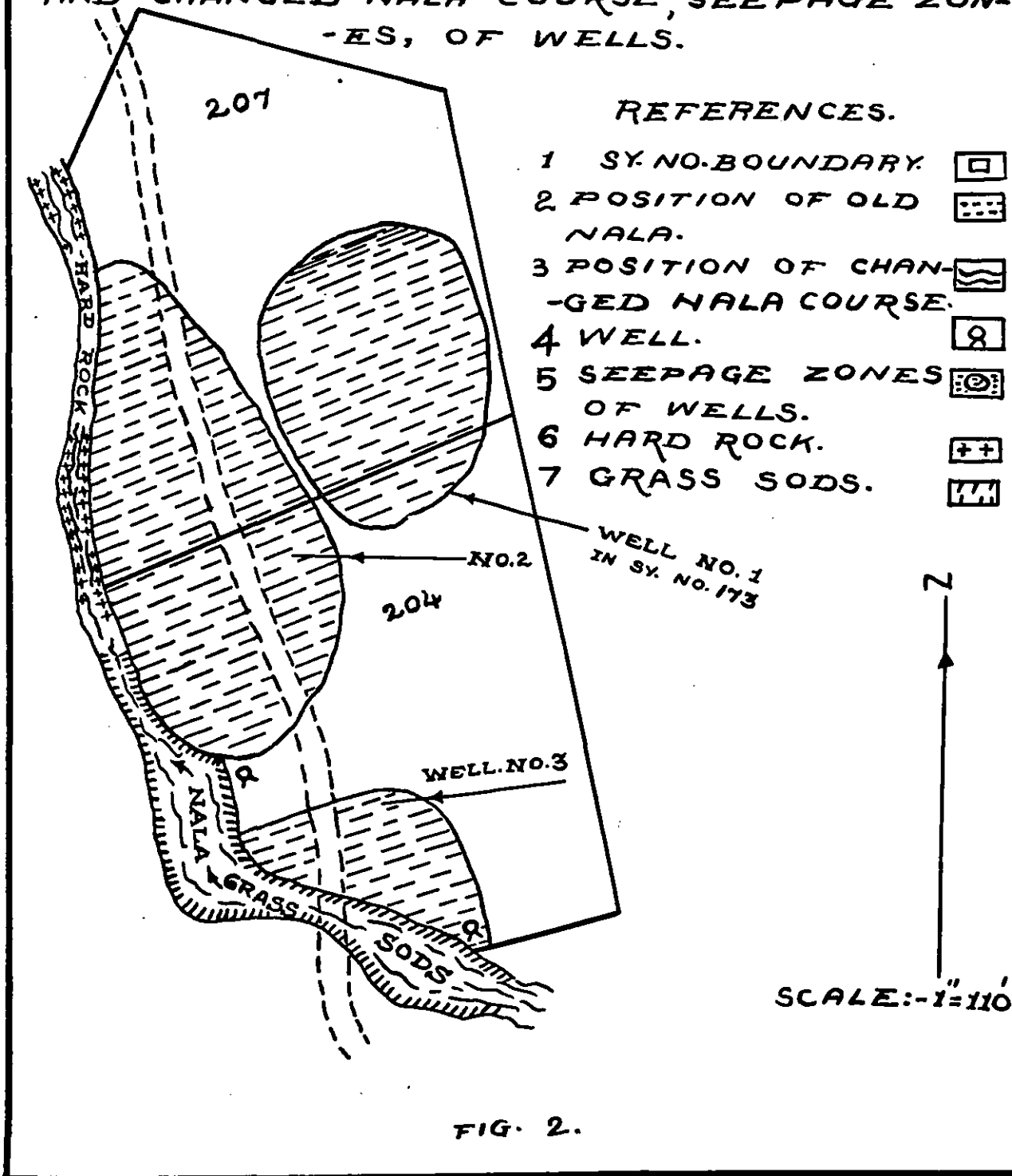
FIG. 1

ILL-DRAINED PROJECT AT.

AGALGAON BLNO 23.

TALUKA:-BARSHI DIST:-SHOLAPUR.

PART PLAN SHOWING POSITIONS OF OLD AND CHANGED NALA COURSE, SEEPAGE ZONES, OF WELLS.



ILL-DRAINED PROJECT AT VILLAGE.
 AGALGAON BL. NO. 23.
 TALUKA:-BARSHI DIST:-SHOLAPUR.
 PART PLAN SHOWING AFFECTED
 AREA.



SCALE:-1"=110'

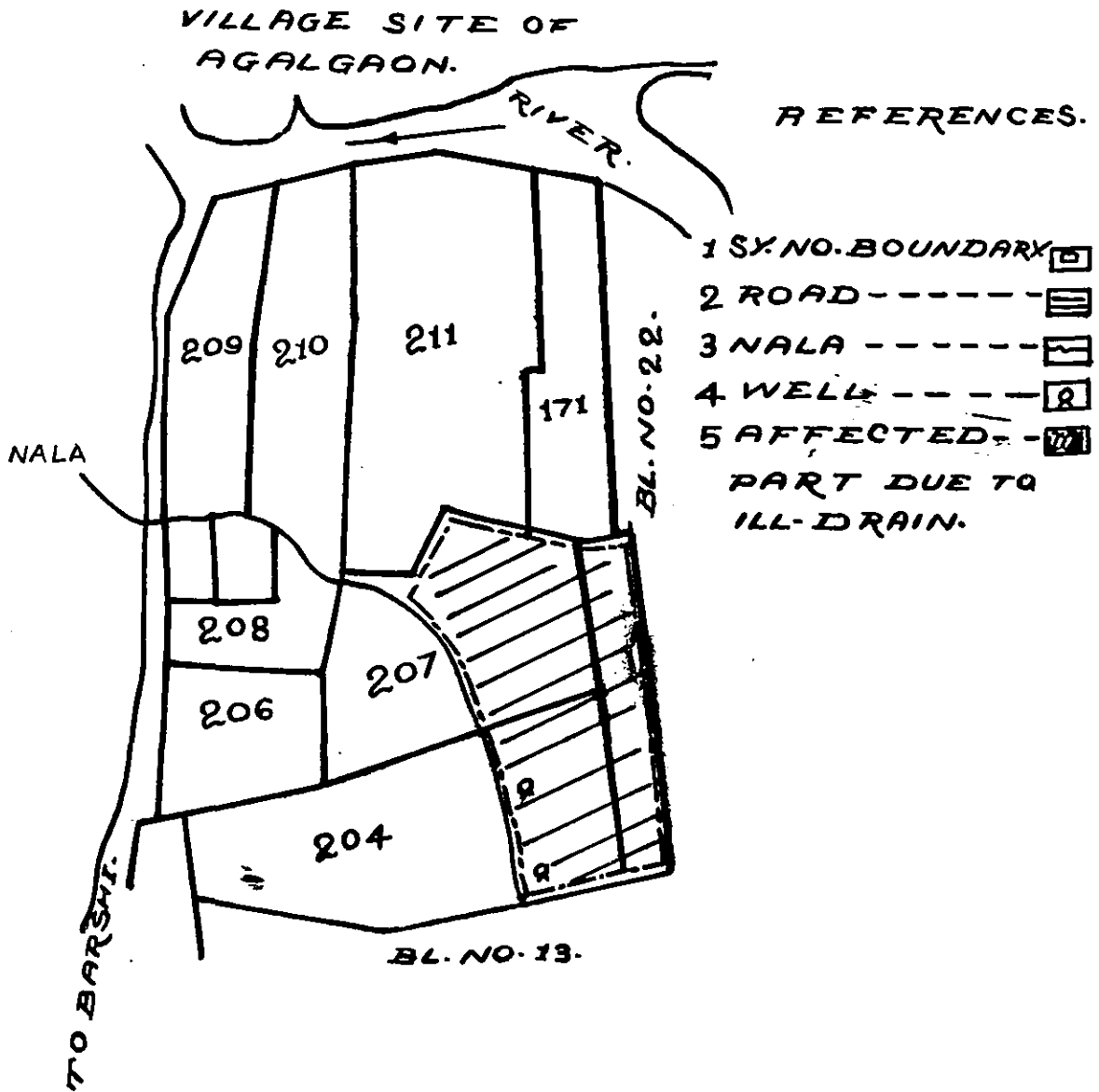


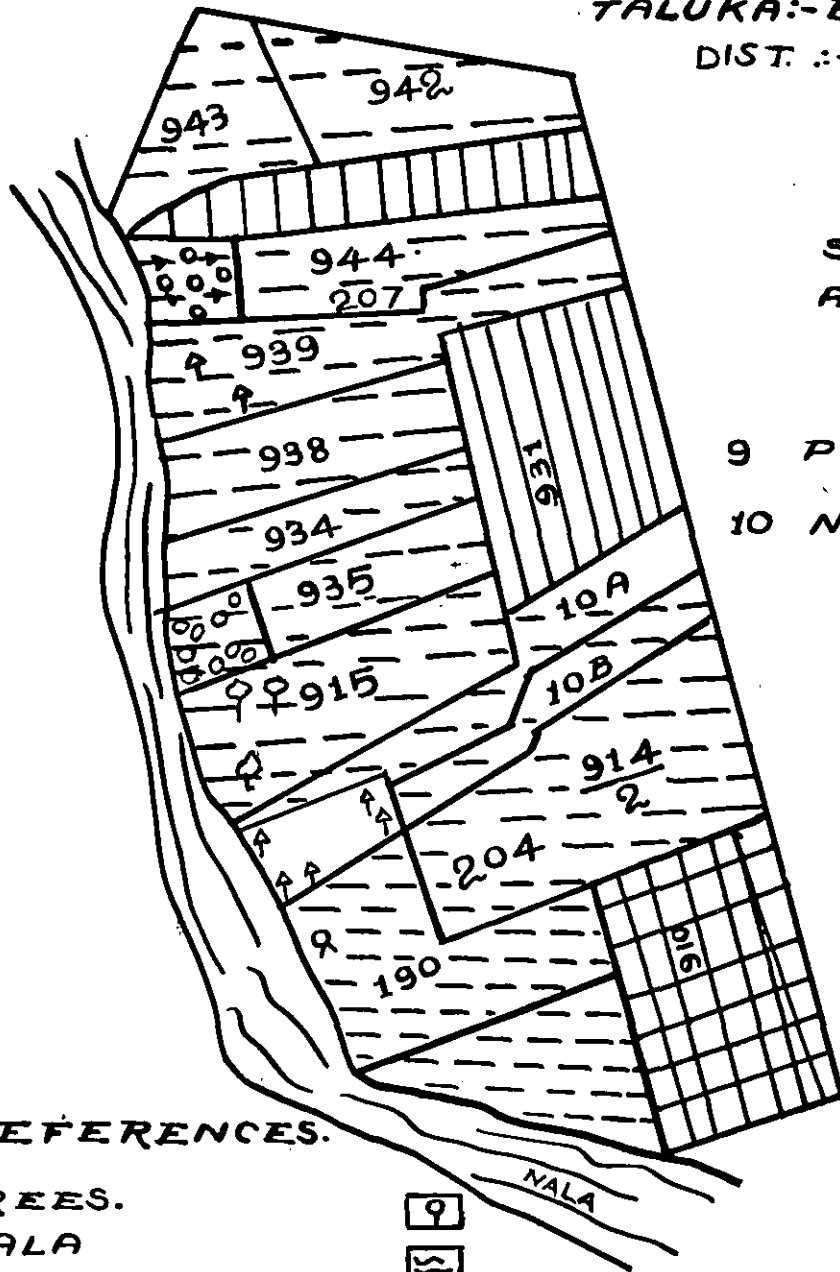
FIG. 3.

RECLAMATION OF ILL-DRAINED
PROJECT AT
AGALGAON BL.NO. 23.

TALUKA:-BARSHI.

DIST. :- SHOLAPUR.

SCALE:-1"=110'
AREA:-55.31
ACRES



9 PERU. [Symbol: square with a cross]
10 NIM TREE. [Symbol: square with a cross and a vertical line]

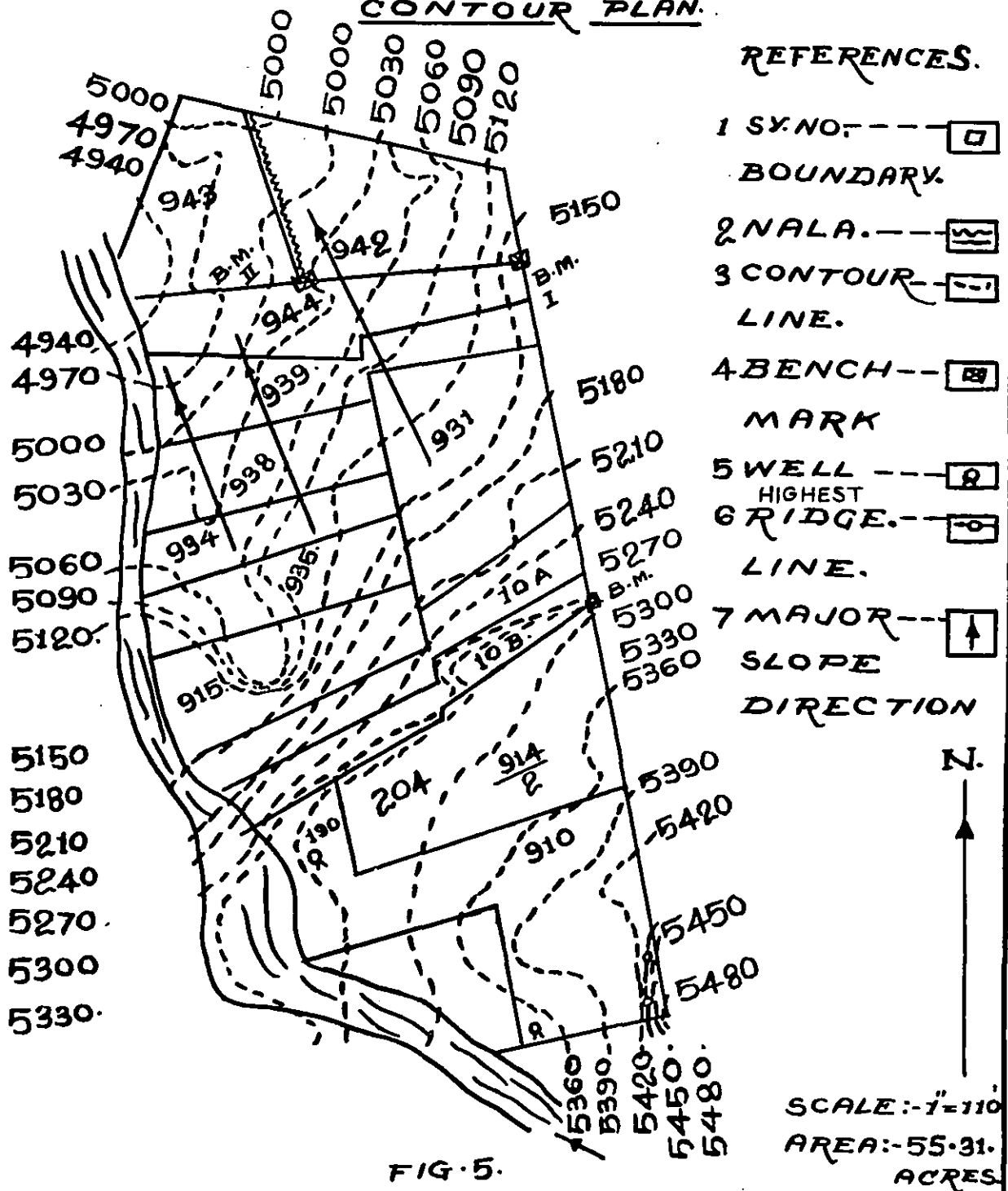
REFERENCES.

- 1 TREES. [Symbol: square with a cross]
- 2 NALA [Symbol: square with wavy lines]
- 3 WELL [Symbol: square with a cross and a vertical line]
- 4 SUITABLE LAND FOR UOWAR [Symbol: square with a cross and a vertical line]
- 5 SUGAR CANE CROP. [Symbol: square with vertical lines]
- 6 PADDY. [Symbol: square with a grid pattern]
- 7 TURMERIC. [Symbol: square with a grid pattern]
- 8 MANGO TREE. [Symbol: square with a cross and a vertical line]

SURVEY MAP
OF THE PROJECT
WITH IT'S SURVEY
PLAN.

FIG.4.

RECLAMATION OF ILLDRAINED PROJECT AT
 AGALGAON BL.NO.23.
 TALUKA:-BARSHI. DIST. SHOLAPUR.
 PART PLAN SHOWING AFFECTED AREA 160
 ACRES.
CONTOUR PLAN.



PLAN SHOWING THE DRAIN ALIGNMENTS.
RECLAMATION OF ILL-DRAINED PROJECT AT VILLAGE.

AGALGAON BL.NO. 23.
TALUKA:-BARSHI DIST:-SHOLAPUR.

N.

SCALE:-1"=110'

AREA=55.31 ACRES

REFERENCES

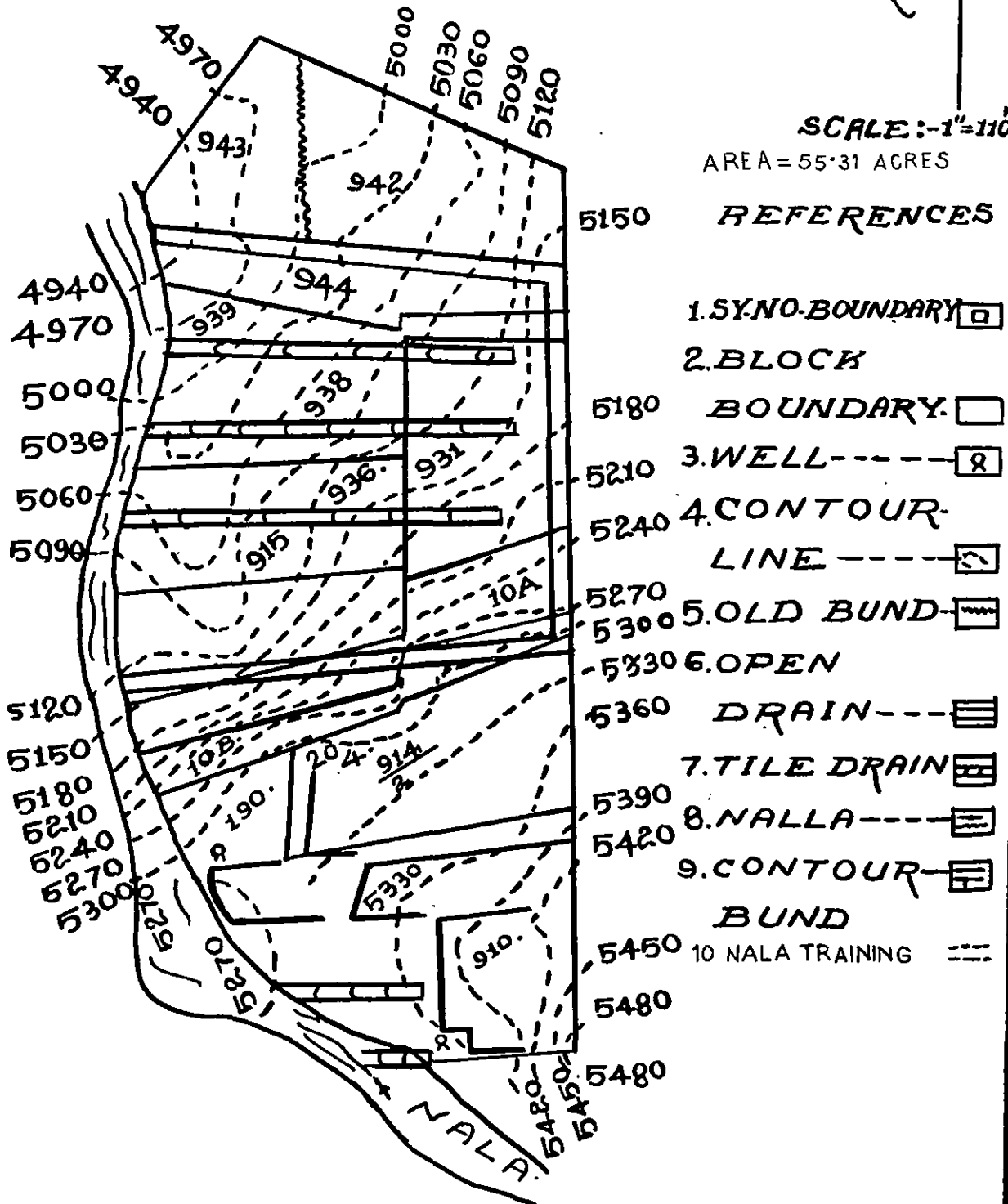
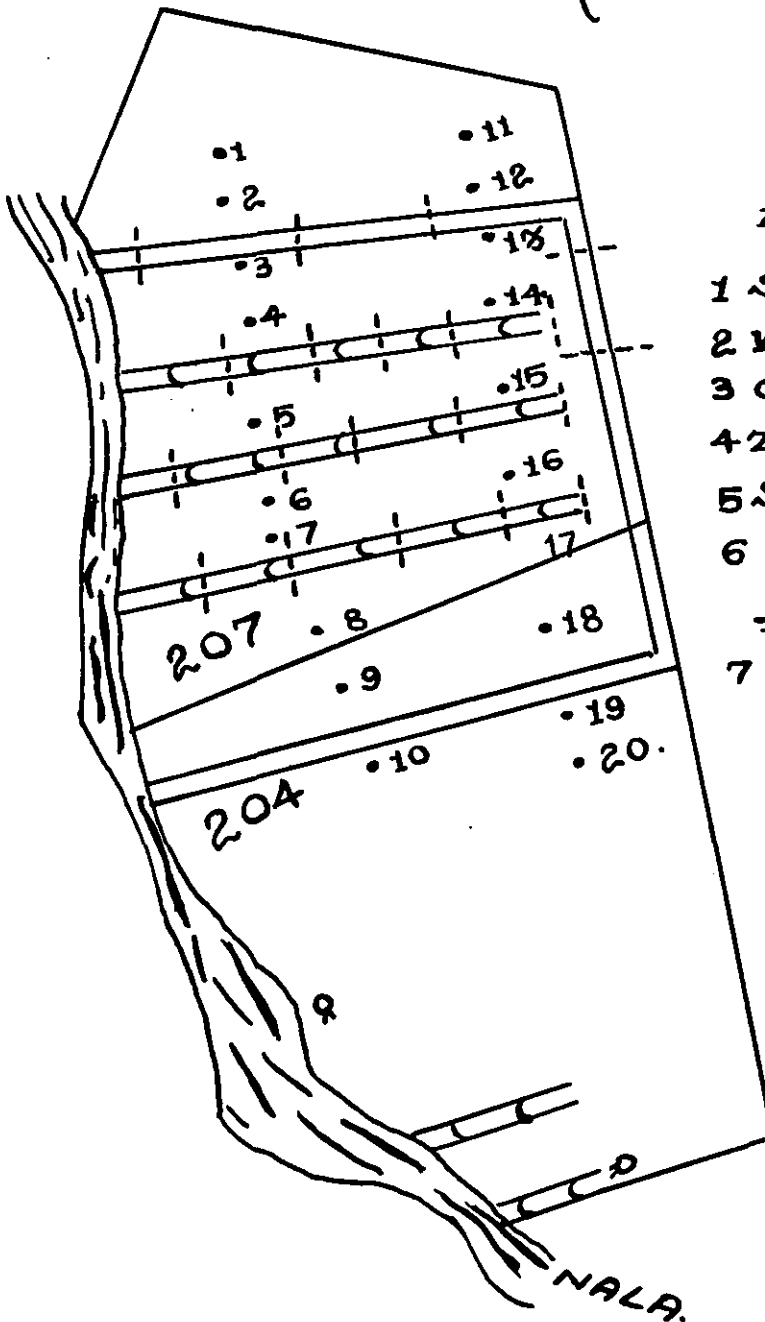


FIG-6.

PART PLAN SHOWING ALIGNMENTS
OF DRAINS SOIL-PITS PIEZOMET-
ER TUBES.



ILL-DRAINED PROJECT AT.
AGALGAON BL.NO.23.
TALUKA :- BARSHI. DIST:-SHOLAPUR.



- REFERENCES
- 1 SY.NO. BOUNDARY.
 - 2 WELL -----
 - 3 OPEN DRAIN-----
 - 4 TILE DRAIN-----
 - 5 SOIL PIT.-----
 - 6 PIEZOMETE.-----
 - 7 NALA -----

FIG-7

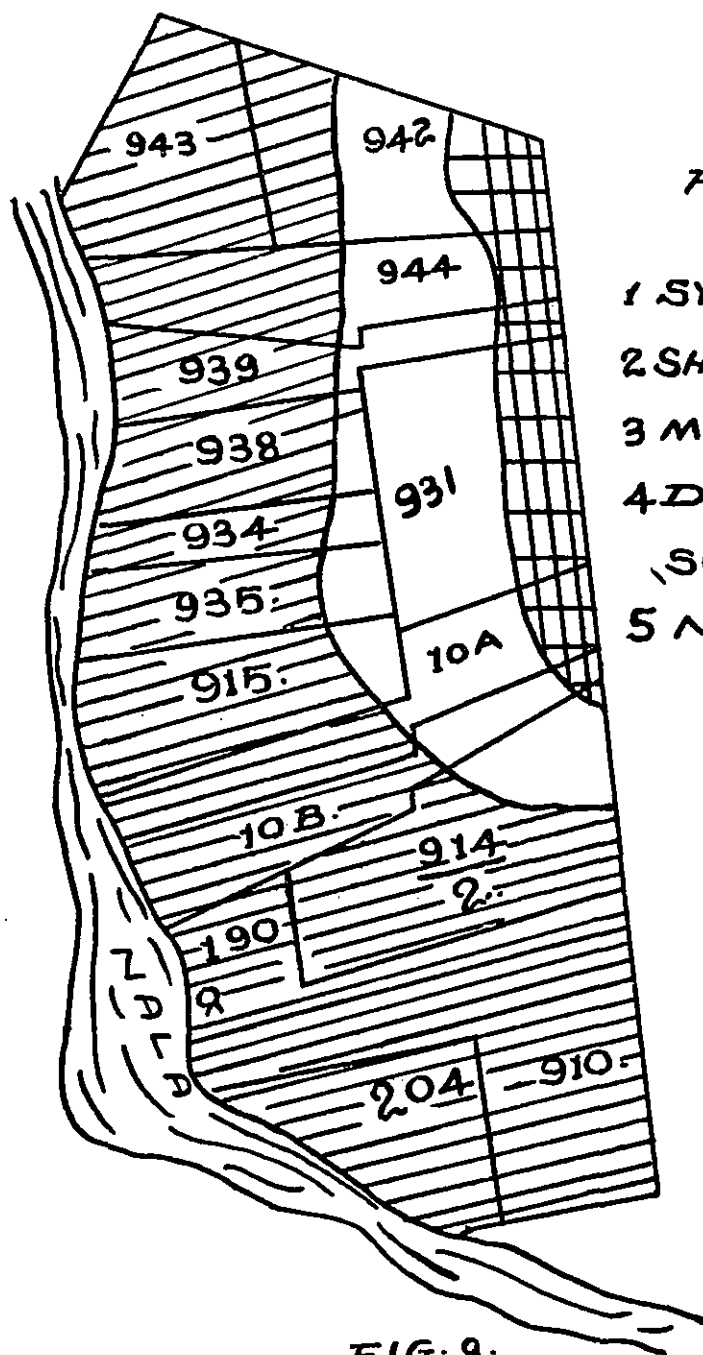
SCALE:- 1"=110'

RECLAMATION OF
ILL-DRAINED PROJECT AT
AGALGAON BL.NO.23.
TALUKA:-BARSHI DIST:-SHOLAPUR.



PART PLAN OF SOIL TYPES.

SCALE:-1"=110'
AREA=5531 ACRES



REFERENCES.

- 1 SY.NO-BOUNDARY
- 2 SHALLOW SOIL
- 3 MEDIUM SOIL
- 4 DEEP BLACK SOIL
- 5 NALA

FIG. 8.

AGALGAON BL. NO. 23.
DRAIN NO. 3.

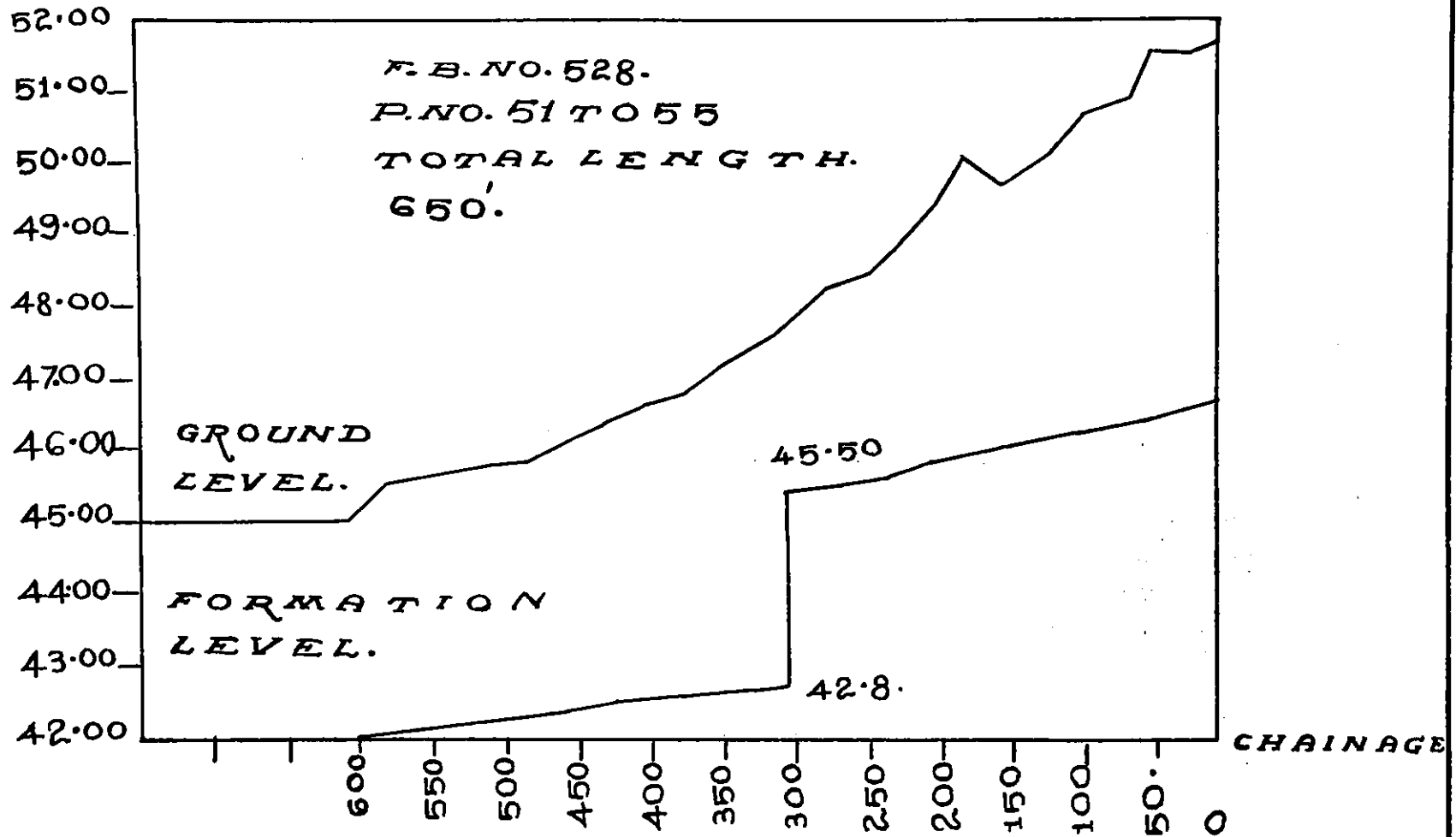


FIG. NO. 9.

SCALE :- 1" = 2'
HORIZONTAL = 1" = 100'

AGALGAON BL NO. 23.
DRAIN NO. 4.

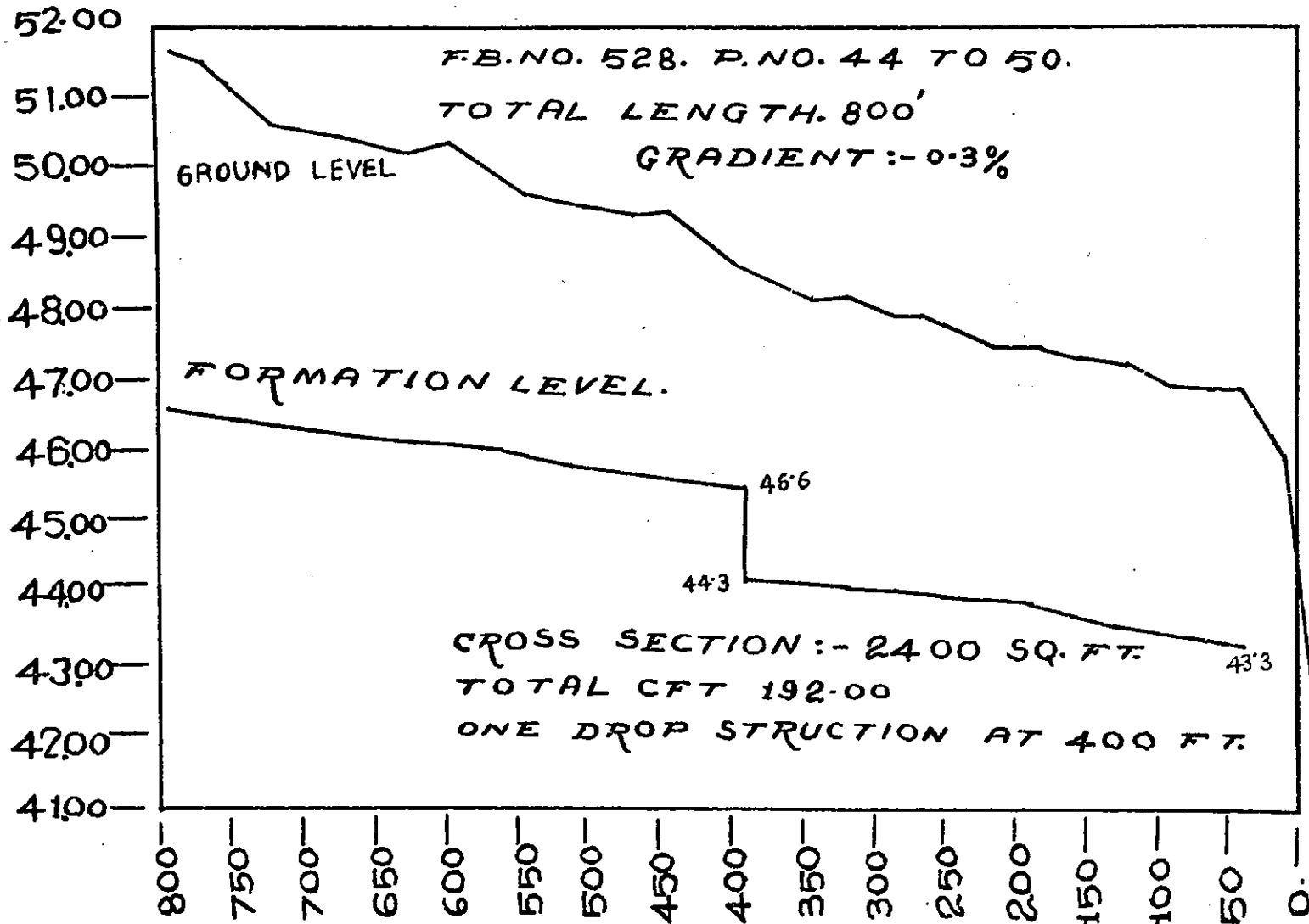


FIG. 10

A GALGAON BL. NO. 23. DRAIN NO. 5.

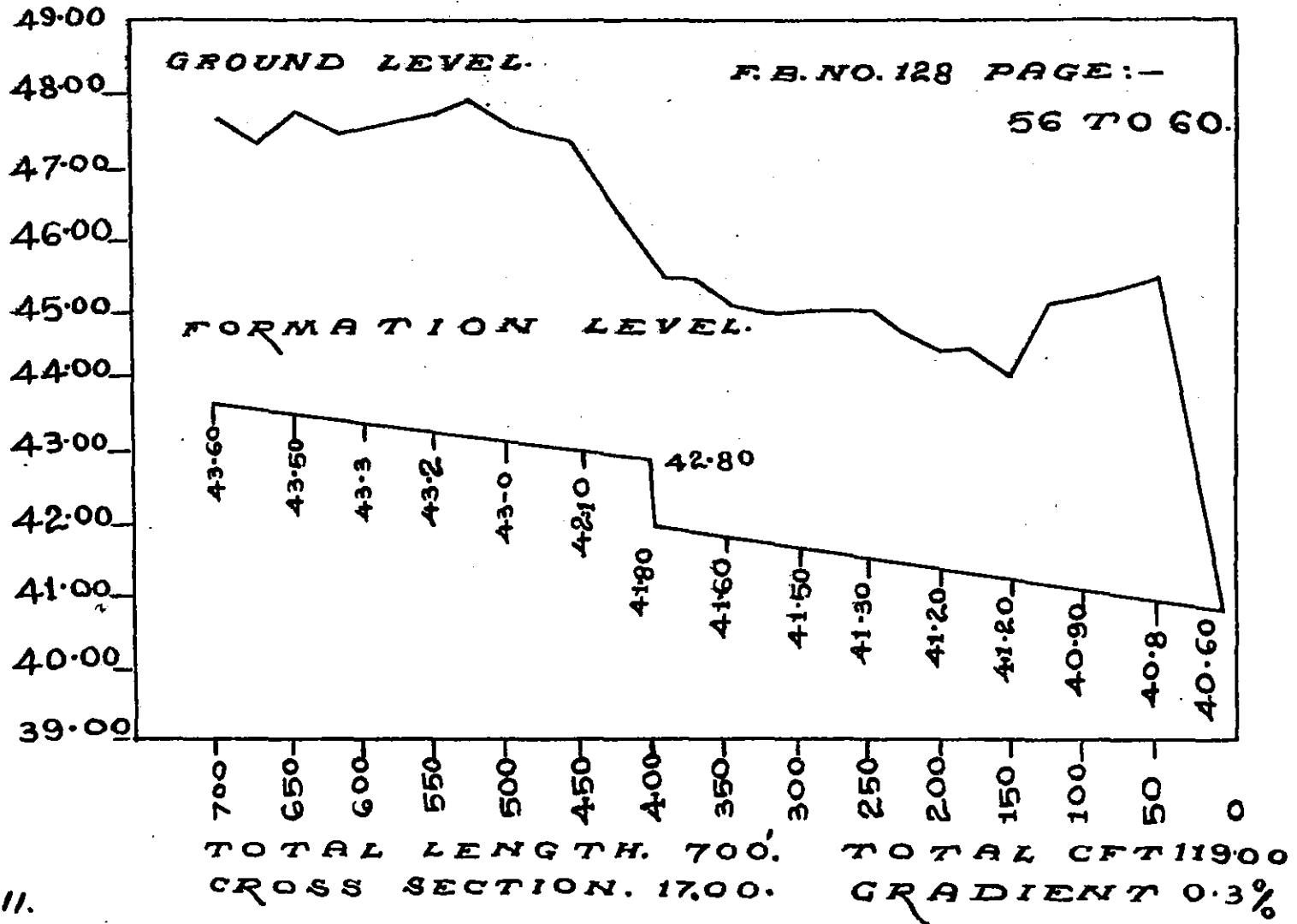


FIG. II.

AGALGAON BL. NO. 23 DRAIN NO. 6

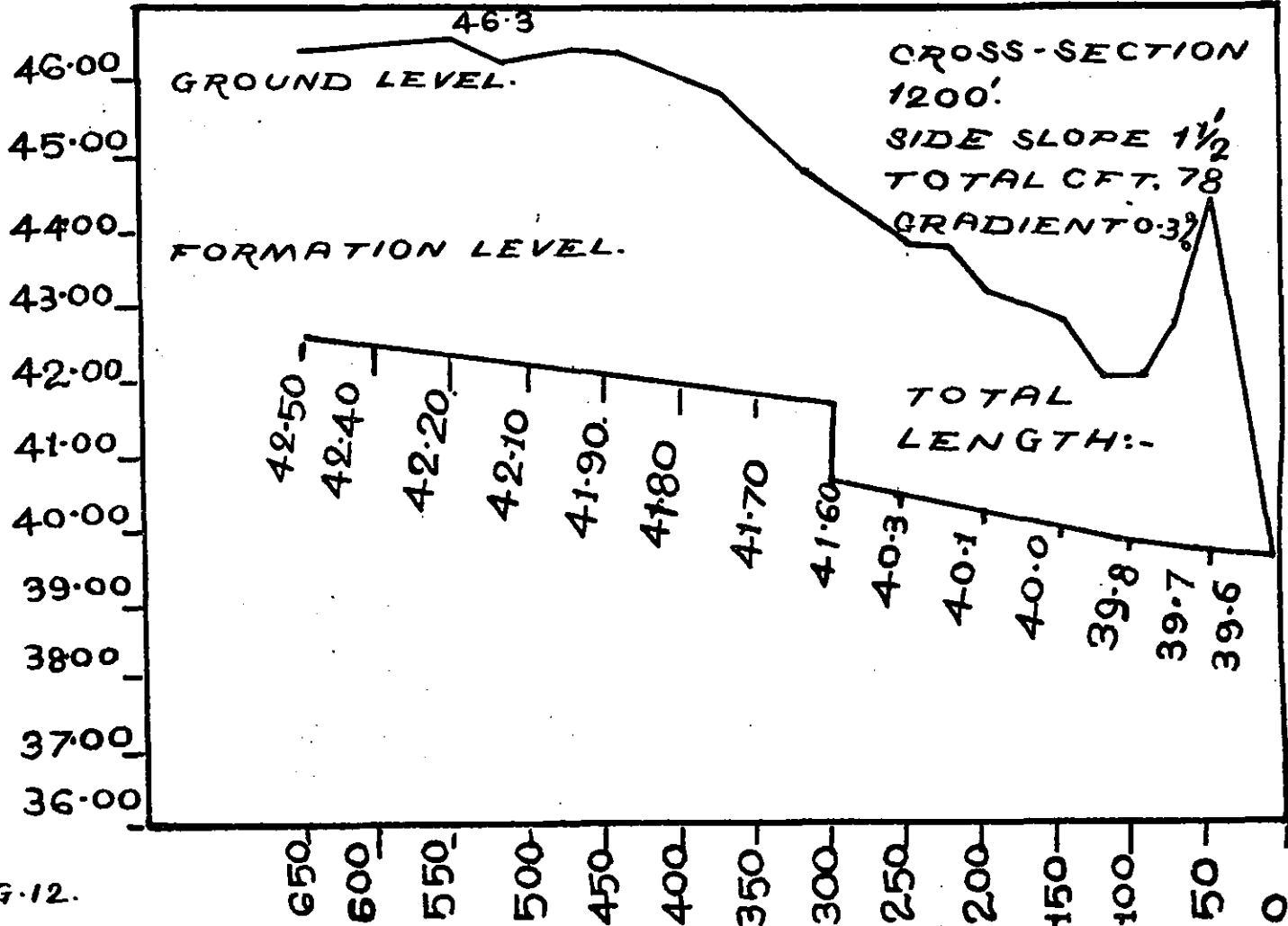


FIG. 12.

AGALGAON BL. NO. 23
DRAIN NO. 7

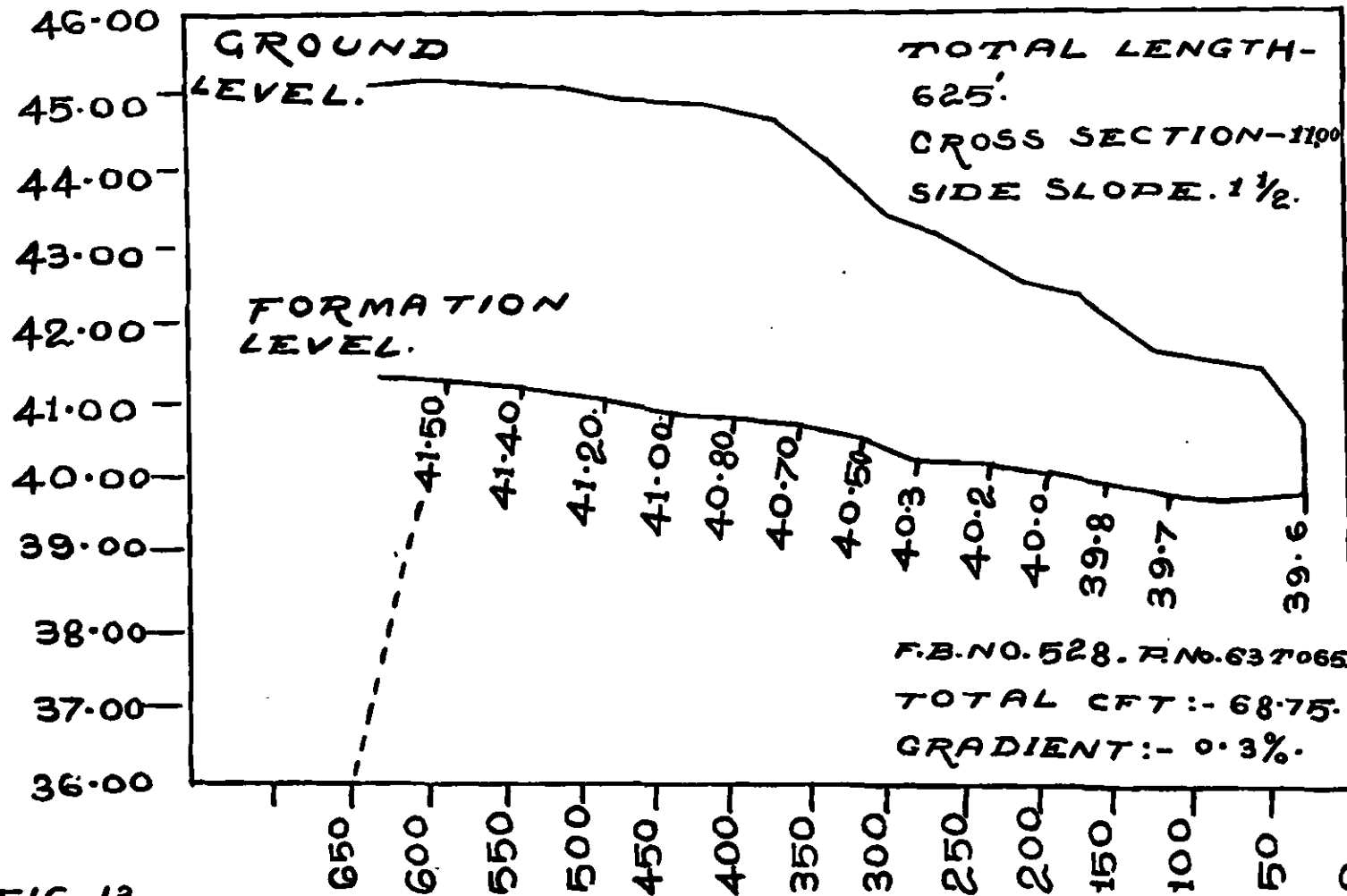


FIG. 13

AGALGAON BL. NO. 23
DRAIN NO. 8

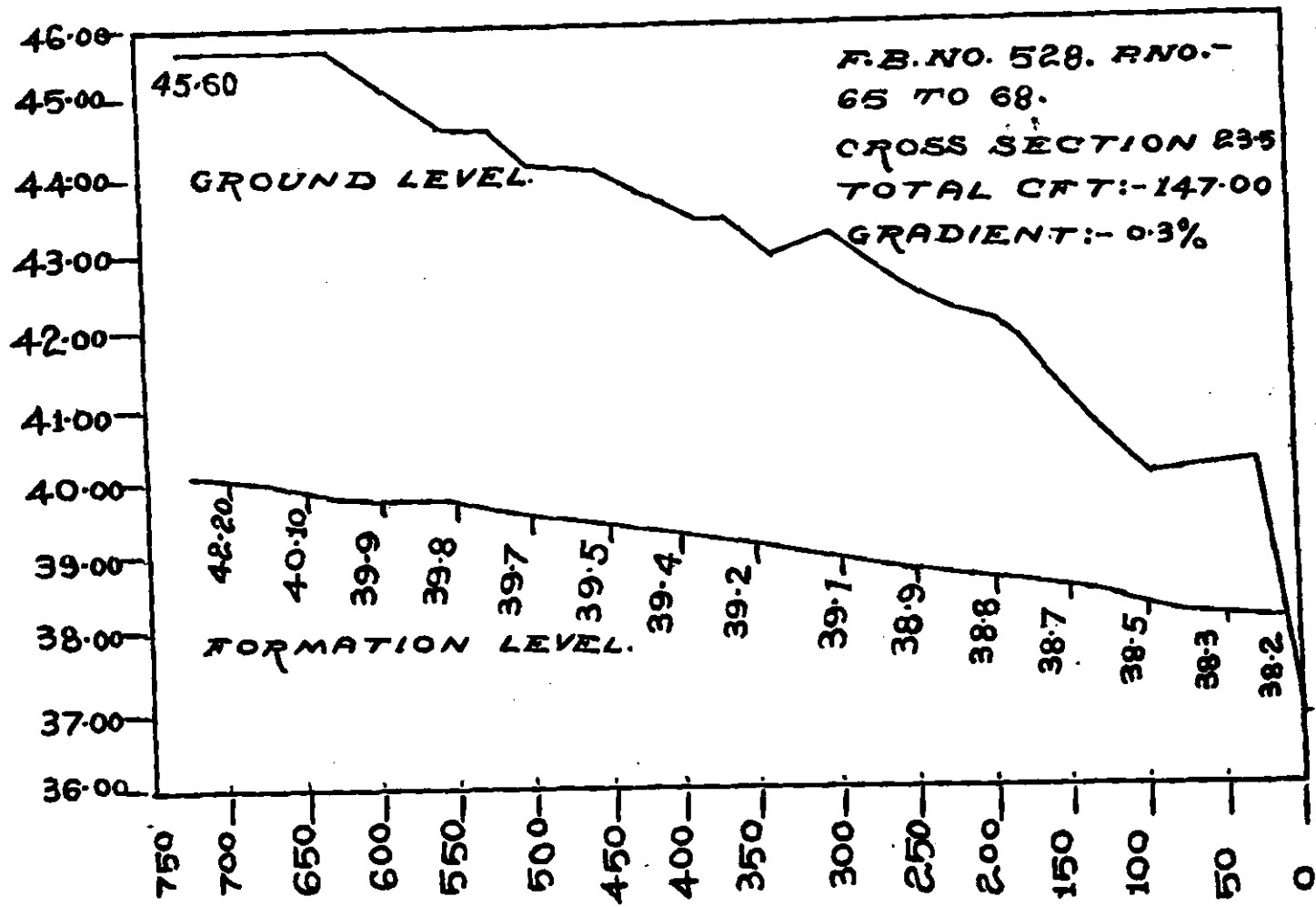
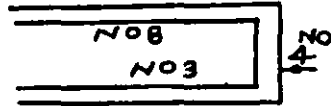
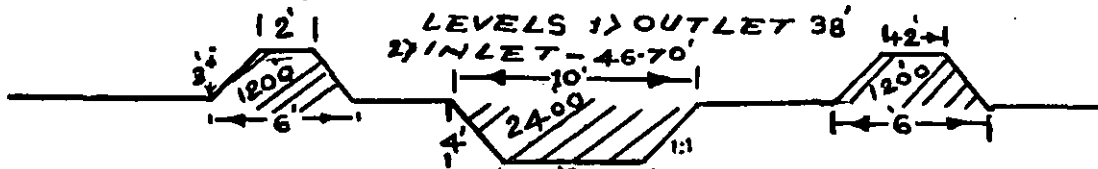


FIG. 14.

AGALGAON BL. NO. 23.
OPEN DRAINS



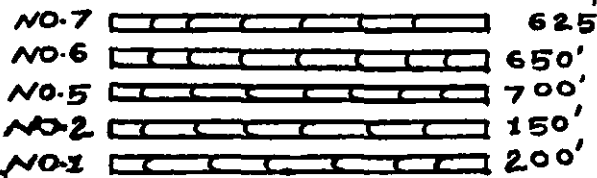
- 1) LENGTH 2175 FT.
- 2) SECTION 24.00' SQ.
- 3) SIDE SLOPE 1:1.
- 4) % OF SLOPE 0.3%



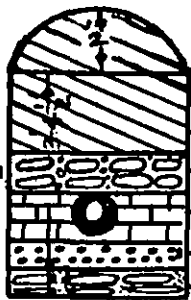
DETAILS OF OPEN DRAINS.

SR. NO.	LENGTH	SECTI- ON. SQ.	BED SLOPE	LEVAL INLET.	SIDE SLOPE	LEVAL OUTLE T.	REMARKS.
3	650'	24.00	0.3%	46.70	1:1	42.00	
4	800'	"	"	46.60	"	43.30	
8	725'	"	"	40.20	"	38.00	

TILE DRAINS



- LENGTH 2325'
- SECTION 600' SQ.
- SIDE SLOPE.
- % OF SLOPE. 0.3%
- LEVELS IN LET. 43.60
- OUTLET:- 39.50



- IN ENGL. NOT TO SCALE.
- EARTH & MURUM.
- 4" TO 6" MURUM.
- 5" BOULDERS.
- SAND.
- PEBBLES.

DETAILS OF TILE DRAINS

SR. NO.	LENGTH	SECTION IN SQ. FT.	SIDE SLOPE	% SLO- PE	LEVELS INLET.	LEVELS OUTLETS	REMARKS.
1	200'	600	NIL	0.3%	-	-	-
2	150'	"	"	"	-	-	-
5	700'	6.50	"	"	43.60	40.60	-
6	650'	6.60	"	"	42.50	39.50	-
7	625'	6.20	"	"	41.50	39.50	-

FIG. 15.

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