

**A Leveling Report on Location Sketches and Altitudes of Land
and Water Surface of Selected Wells and Stream Cross Sections
in Banke, Bardiya, Chitwan, Dhanusha, Kailali, Kanchanpur,
Mahottari, Saptari, Sarlahi, and Siraha Districts in the Terai.**

Technical Report Number 32

by

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Shallow Ground Water Investigations in the Terai

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ABSTRACT

Tables of altitudes of land and water surface at selected wells and stream cross sections and sketches of their locations from 10 districts in the Terai are aggregated in this leveling report. The districts are Saptari, Siraha, Dhanusha, Mahottari, Sarlahi, Chitwan, Banke, Bardiya, Kailali and Kanchanpur.

INTRODUCTION

Purpose and scope

A project, NEP/86/025, to investigate the shallow ground water resources of Terai districts began in 1987. The United Nations Department of Technical Co-operation for Development and the Ground Water Resources Development Board, HMG, Nepal are the responsible entities. This data report on altitude of land surface at wells, of water surface at stream cross sections and sketches of well and cross section locations is one of a series of reports reporting on the information gained from the project.

The purpose of this data report is to present in one document the information gained from 10 district leveling reports on altitudes and locations of project wells and altitudes and locations of water surface at selected stream cross sections. The 10 districts are Saptari, Siraha, Dhanusha, Mahottari, Sarlahi, Chitwan, Banke, Bardiya, Kailali, and Kanchanpur. Banke District was done in 1990 but the other 9 districts were begun in April 1991 and completed by December 15, 1991.

These 10 districts were all contracted to and done by DEVTEC NEPAL PRIVATE LTD. Department of Irrigation (DOI) was responsible for the Banke District contract and NEP/86/025 was responsible for the contracts with the other 9 districts.

Materials provided to Devtec

Devtec was provided a map of each district showing the location of the wells and cross sections to be surveyed. They were provided with a letter "To whom it may concern" indicating that Devtec was performing a survey for project NEP/86/025. They also received a letter for each of the DOI officers in charge of the respective districts as a person was provided by the offices to show Devtec the wells on the ground.

Terms and conditions of contract with Devtec

1. To measure exact spot height altitude of wells with reference to standard Bench Mark and to stick to those wells designated on the maps given by NEP/86/025.
2. If no bench marks are available in a district, a reference point will be set and all surveying will be related to that point.
3. To measure absolute water level altitude of the streams and rivers at the designated places on the provided maps.
4. To provide a detailed sketch map and description of each measured well and stream altitude separately so that anybody can locate the well or stream exactly in the field as illustrated in the figure at the bottom of the page.
5. To mention exact well condition as it exists such as acceptable, damaged, cap open, cap closed and etc.
6. To complete the districts by a specified time. For example, the last group of districts had to be completed and the reports submitted to NEP/86/025 by December 15, 1991.
7. Survey accuracy and adequacy will be determined by the GWRDP office and officer in charge which looks after the respective districts.
8. To provide a list of surveyors and details about the numbers, qualifications, and experience of the crews in each district.
9. To provide the starting and ending dates of the survey in each district. Provide duration in the field and methods of transportation to, from and in the field.
10. To describe the methodology of surveying in detail including methods of transportation, line-kilometer coverage, errors, accuracy, any limitations and etc.
11. To provide a small index map of Nepal showing the district surveyed.
12. To submit five copies of the final report for each individual district to NEP/86/025.

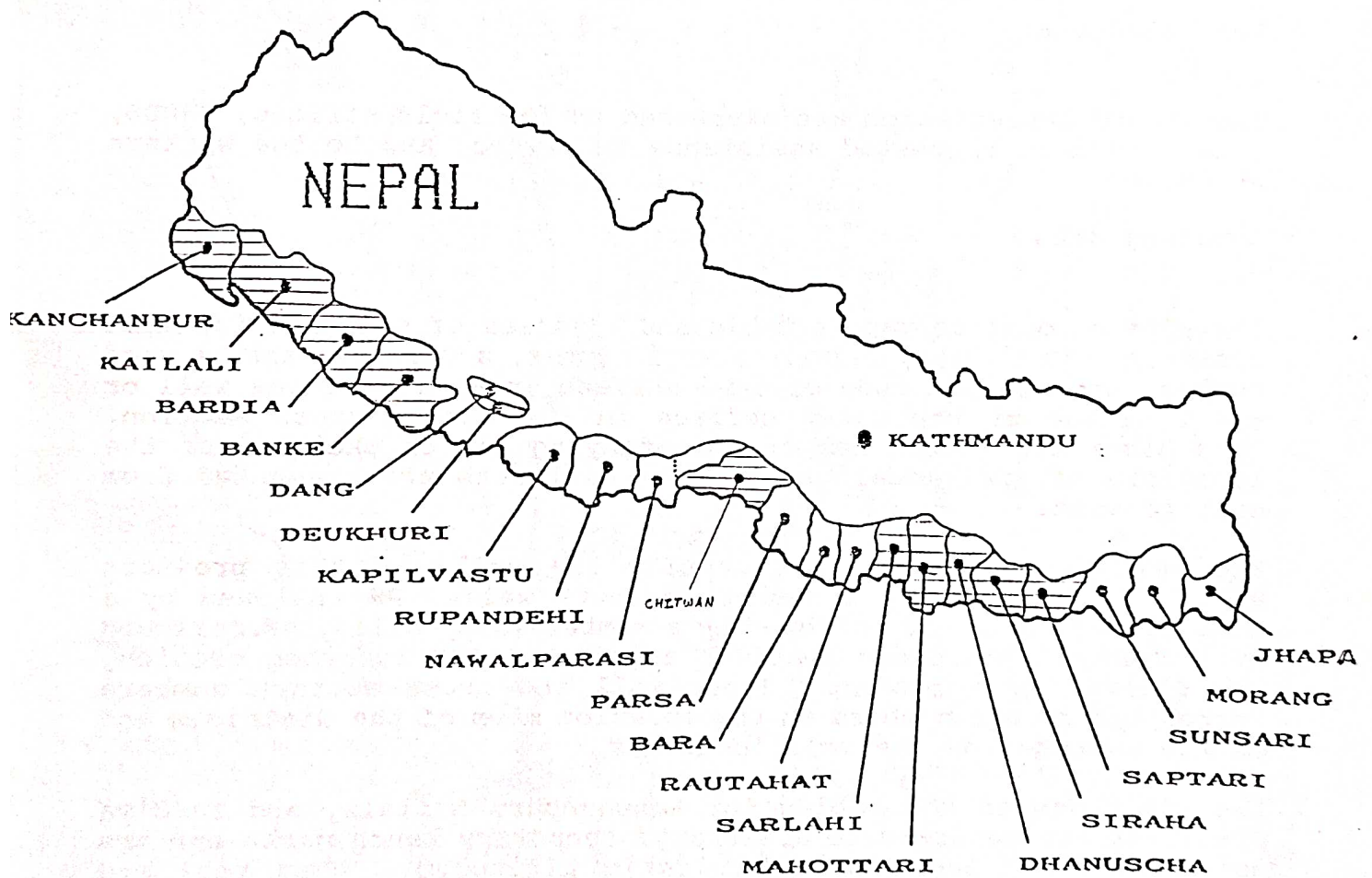


Figure 1.--Map of Nepal showing Terai Districts. The 10 districts in this report are hachured.

Location and extent of area

The distribution of the 10 districts is shown in Figure 1. The districts without sketches of the well locations are also shown as there are ground water reports for all districts.

Methods of investigation

To quote the Devtec reports, "The levelling survey work was conducted by fly levelling with double reading method to avoid reading error. The readings were computed by Rise and Fall method. The back-sight and fore-sight had been taken from the same setting of the instrument. Maximum necessary precautions were taken to minimize the possible errors, such as instrumental, personal and errors due to natural sources." All altitudes and elevations in the report are in meters (m).

Acknowledgment

Thanks and appreciation are expressed to the field offices, GWRDB, which provided requested assistance to Devtec, and to the workers at Devtec.

Leveling data

There is a location map, a table and a series of sketches for each district. The tables contain a well number, a village name, a ward number, and the altitude of land surface in meters at the well or the altitude of the water surface in the stream cross section. Each districts' table has an accompanying set of sketches of the locations of individual wells. The districts are presented from east to west.

The well numbers serve to identify the wells as this projects wells, UN followed by a number; private wells, PW followed by a number; dug wells, DG followed by a number; deep wells, DW followed by a number. The cross sections are identified as cross section, CS followed by a number. These well and cross section numbers correspond to the numbers on the location maps of the districts and on the sketches of the well locations.

The altitudes in the tables for Kanchanpur, Kailali, and Bardiya districts are referred to arbitrary, temporary bench marks and are not actual nor necessarily realistic altitudes. When real and accurate bench marks become available these altitudes must be corrected.

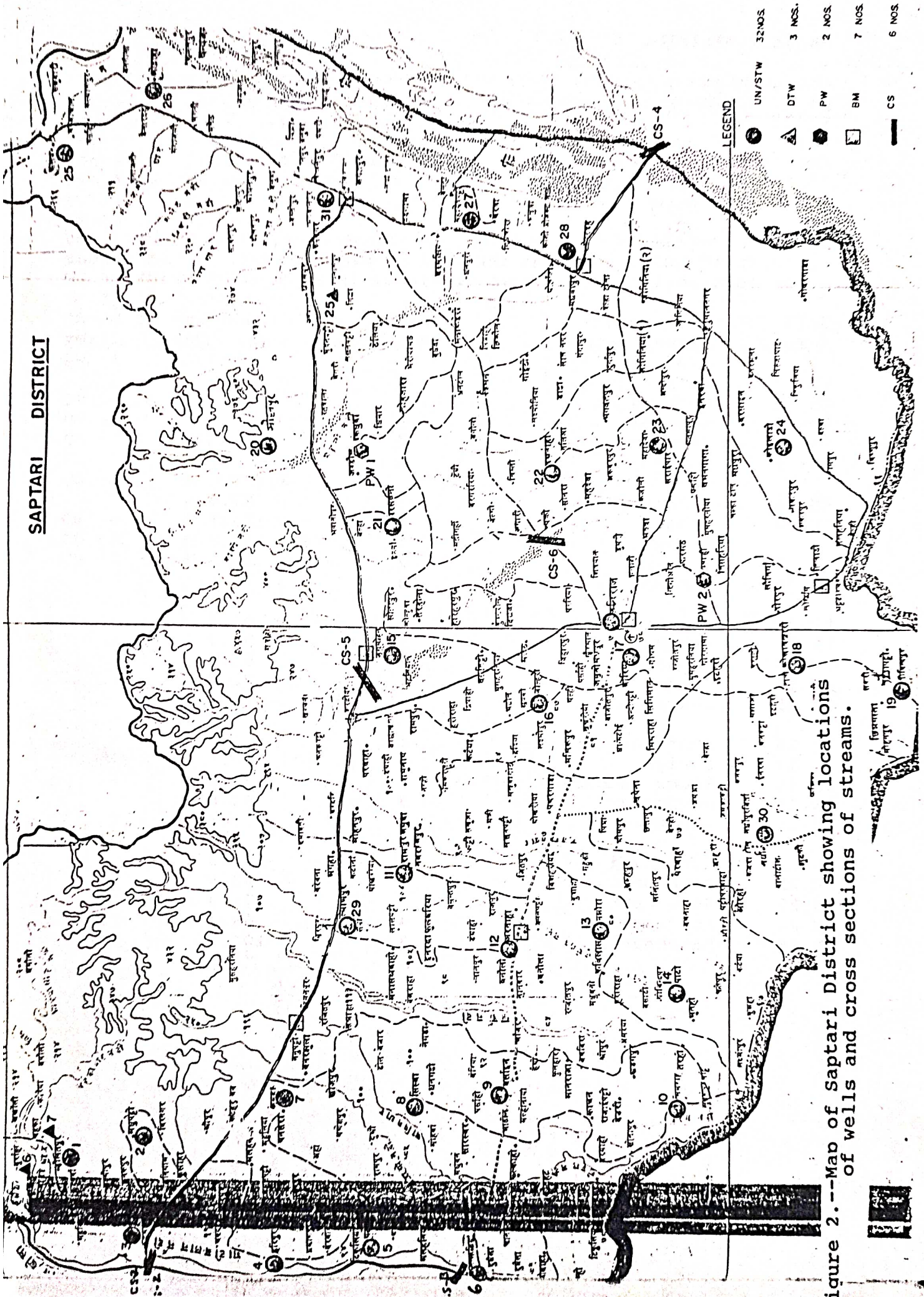


Figure 2.--Map of Saptari District showing locations of wells and cross sections of streams.

Saptari District

Land surface altitudes at 37 wells and the water surface altitudes at 6 stream cross sections were determined in Saptari District. There were 32 UN wells, 1 private shallow well, 1 private deep well, 3 other deep wells and 6 stream cross sections surveyed. Locations are shown on the district map, Figure 2; altitudes are listed in Table 1; sketches of the wells and cross sections are shown in Figures 3 - 13.

Table 1.--Well number, village or stream name, ward number, and altitude of land surface at the well or water surface at the stream cross section in meters above sea level in Saptari District.

<u>Well Number</u>	<u>Village or Stream Name</u>	<u>Ward Number</u>	<u>Altitude of Land or Stream Surface</u>
UN 1	Daulatpur	4	119.3
UN 2	Madhupatti	4	132.8
UN 3	Kadmaha	9	116.1
UN 4	Haripur	4	106.5
UN 5	Paterba	3	92.3
UN 6	Malhaniya	2	87.3
UN 7	Amhan	5	121.5
UN 8	Sisba	1	92.8
UN 9	Barsin	2	87.2
UN 10	Simraha	3	73.1
UN 11	Rampur	3	101.5
UN 12	Arnaha	2	90.3
UN 13	Majhaura	8	82.3
UN 14	Patto	1	72.4
UN 15	Bhatniya	7	115.1
UN 16	Juwalhari	4	92.7
UN 17	Boriya	5	80.1
UN 18	Kocha Bakhari	7	67.6
UN 19	Govindpur	3	62.6
UN 20	Mohanpur	7	131.5
UN 21	Parasbari	2	104.3
UN 22	Bathanaha	1	82.6
UN 23	Sarayapar	8	71.3
UN 24	Koyalari	4	68.2
UN 25	Fatehpur	3	106.2

Table 1.--Continued.

<u>Well Number</u>	<u>Village or Stream Name</u>	<u>Ward Number</u>	<u>Altitude of Land or Stream Surface</u>
UN 26	Aodraha	7	94.3
UN 27	Baramajhiya	9	83.4
UN 28	Portaha	2	78.8
UN 29	Kalyanpur	6	121.5
UN 30	Nargha	7	70.0
UN 31	Kanchanpur	4	92.5
UN 32	Rajbiraj	5	83.8
PW 01	Bakdhuwa	6	109.5
PW 02	Bisarhiya	4	70.3
DW 6	Hardiya	2	134.6
DW 7	Chahkavi	8	129.8
DW 25	Raghunathpur	8	101.3
CS 1	Balan River		121.0
CS 2	Balan River		104.2
CS 3	Balan River		86.1
CS 4	Koshi River		75.1
CS 5	Khandoo Khola		112.2
CS 6	Khandoo Khola		86.0

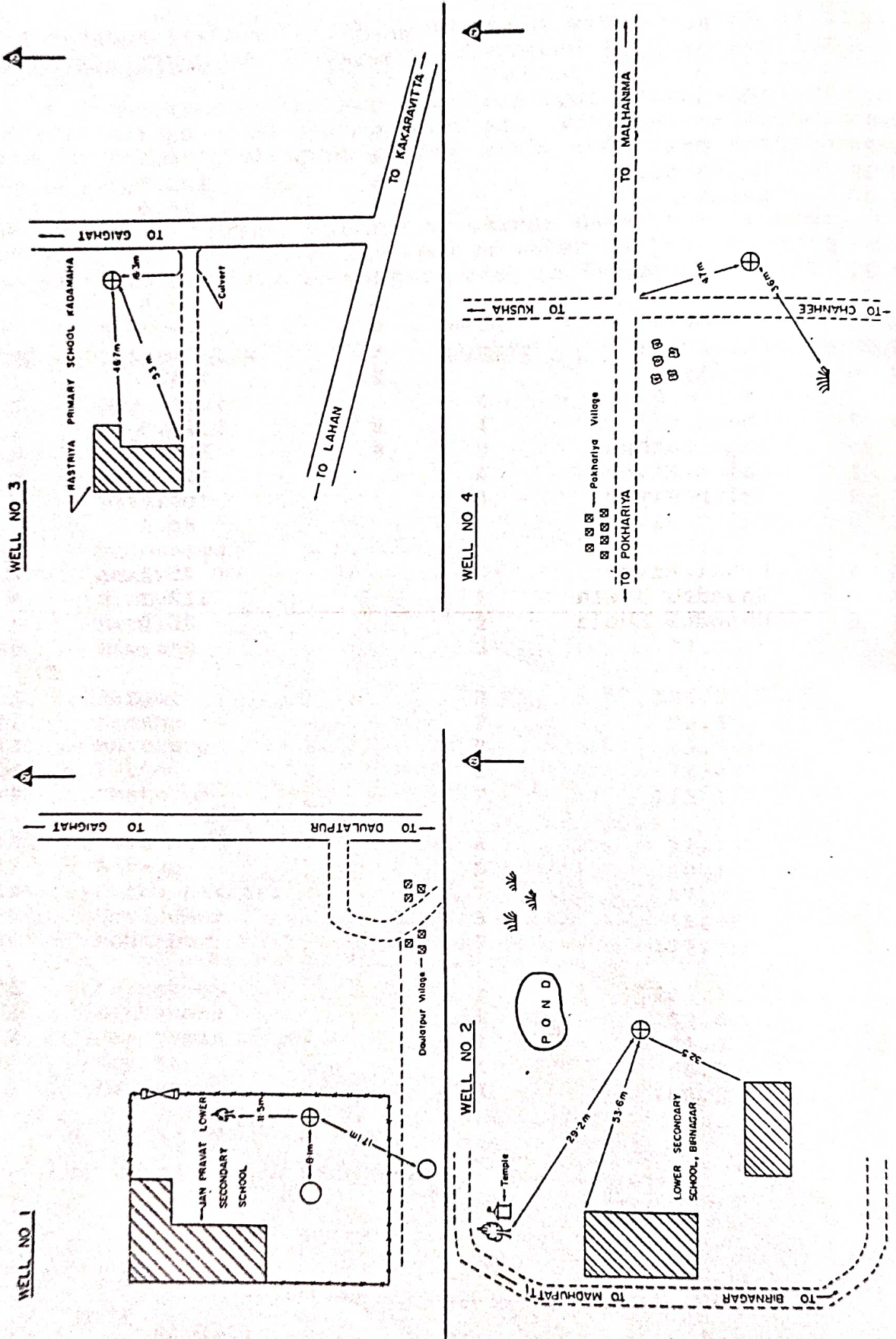


Figure 3.--Sketches of wells 1 - 4 in Saptari District.

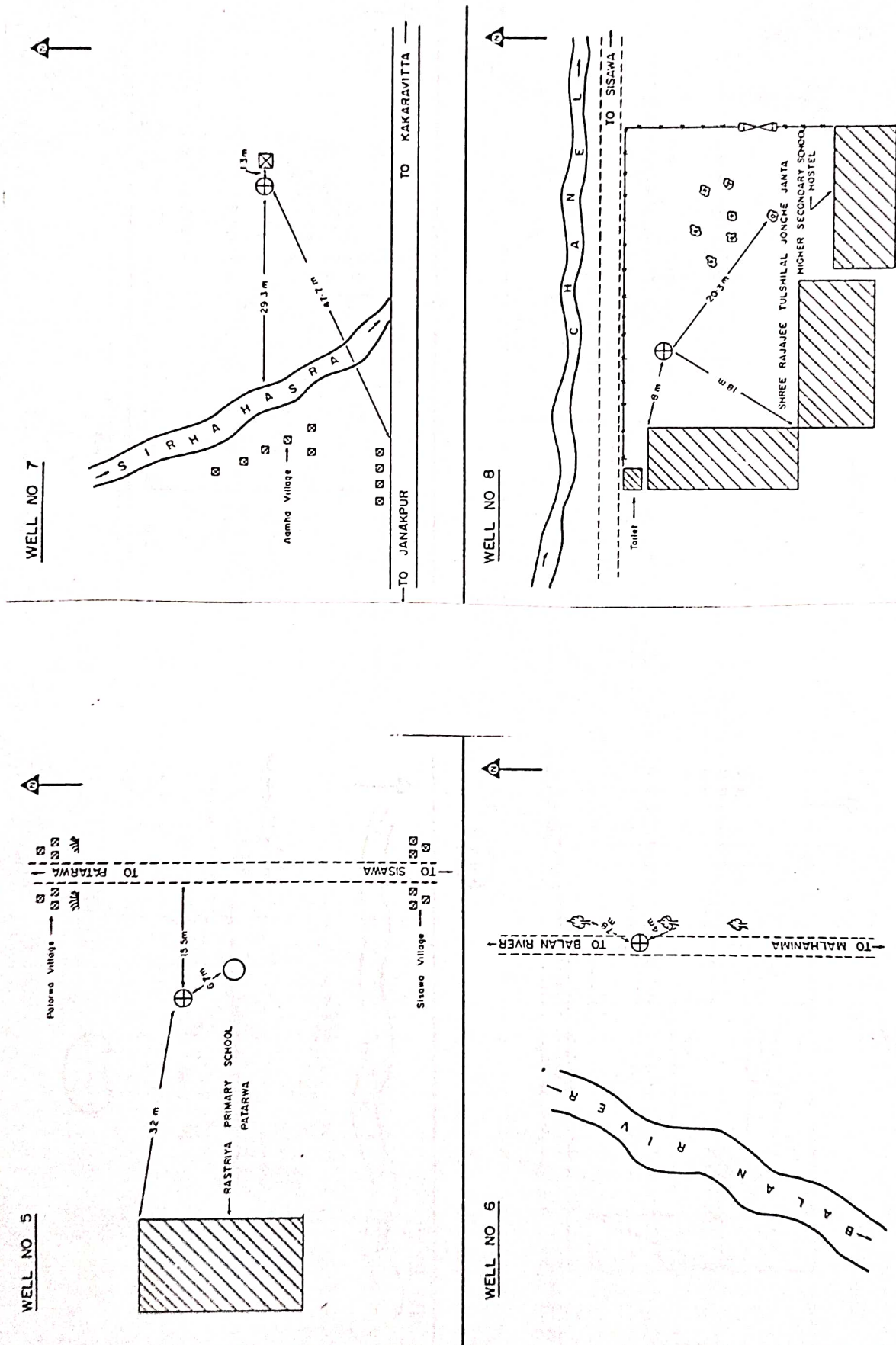


Figure 4.--Sketches of wells 5 - 8 in Saptari District.

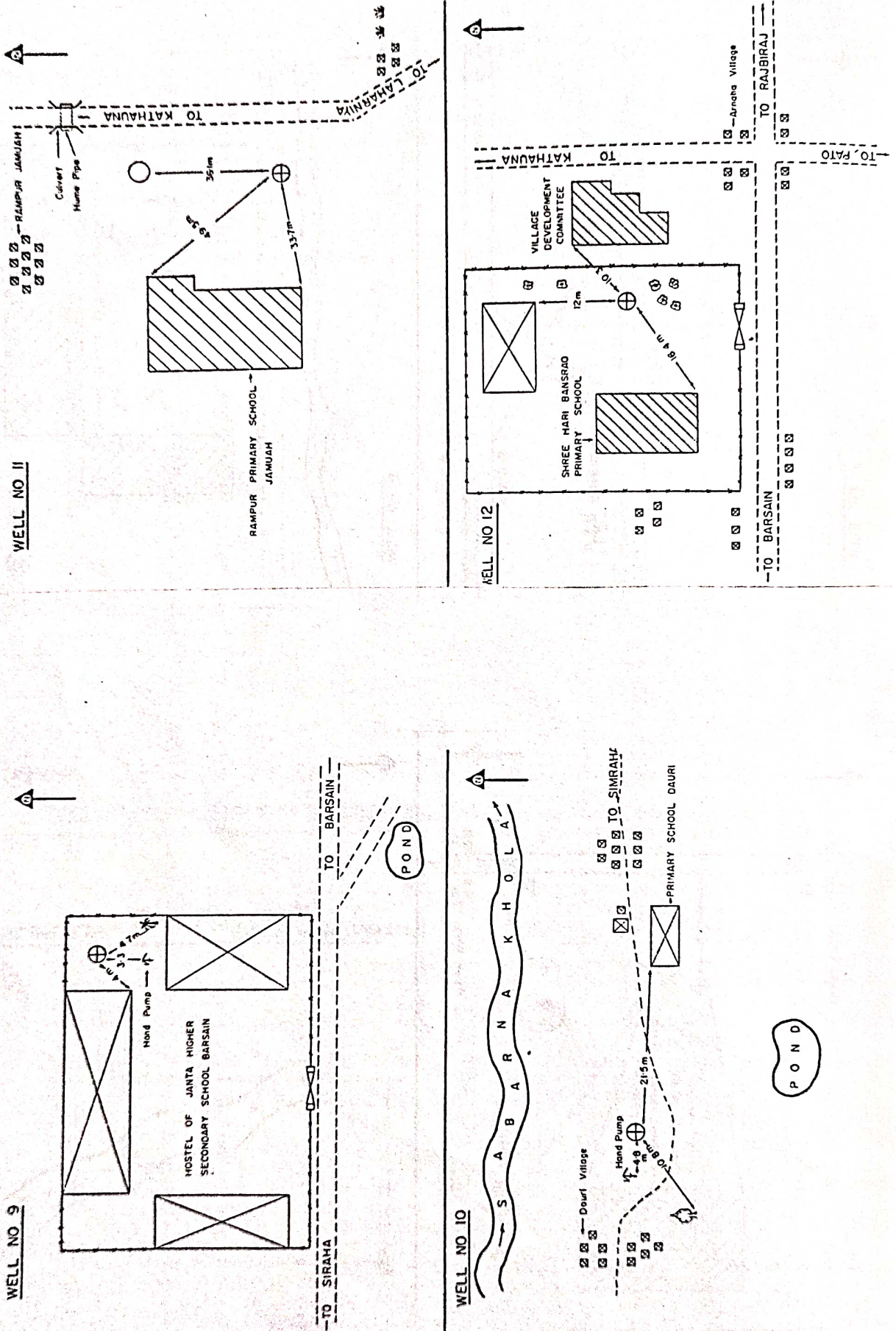


Figure 5.--Sketches of wells 9 - 12 in Saptari District.

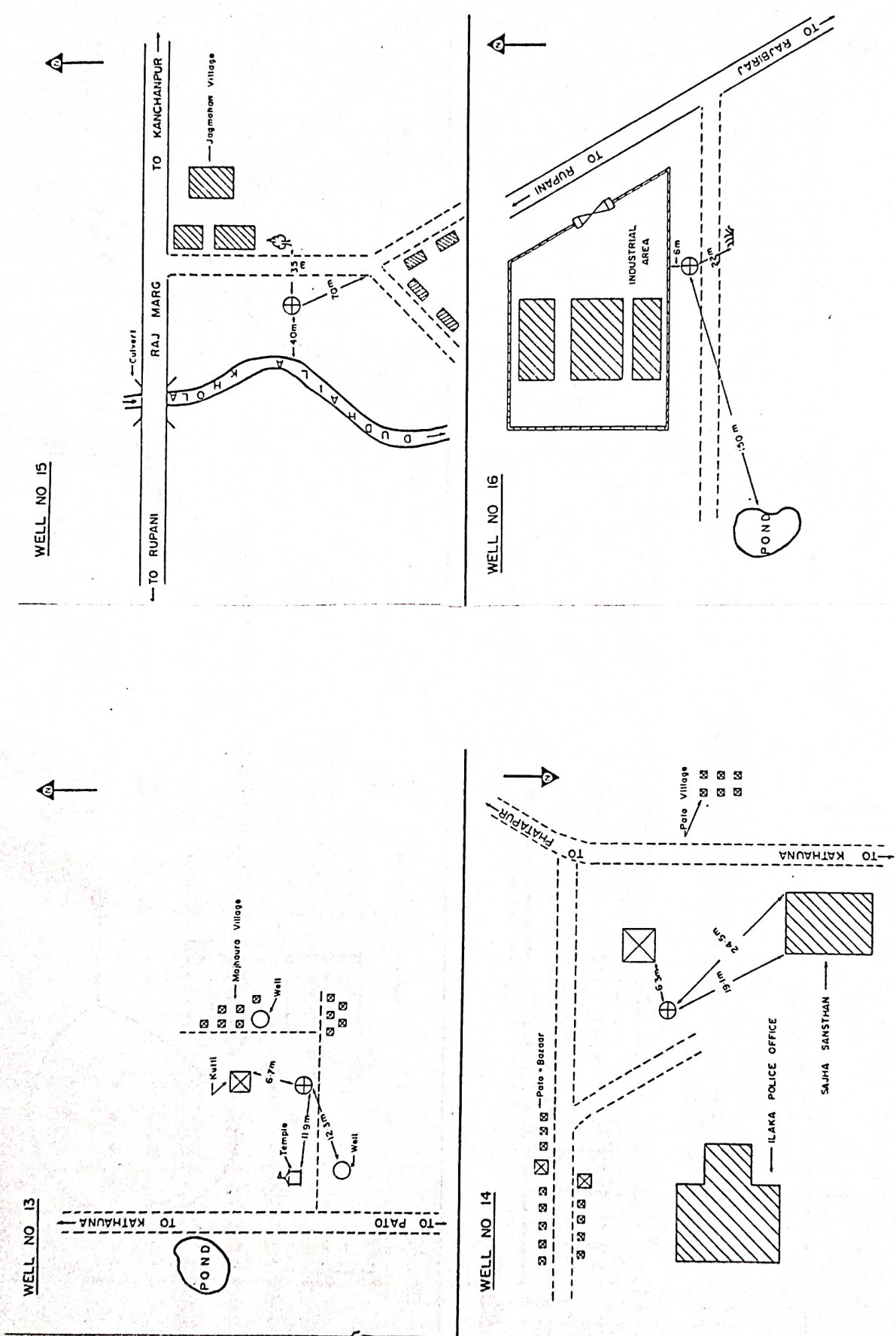


Figure 6.--Sketches of wells 13 - 16 in Saptari District.

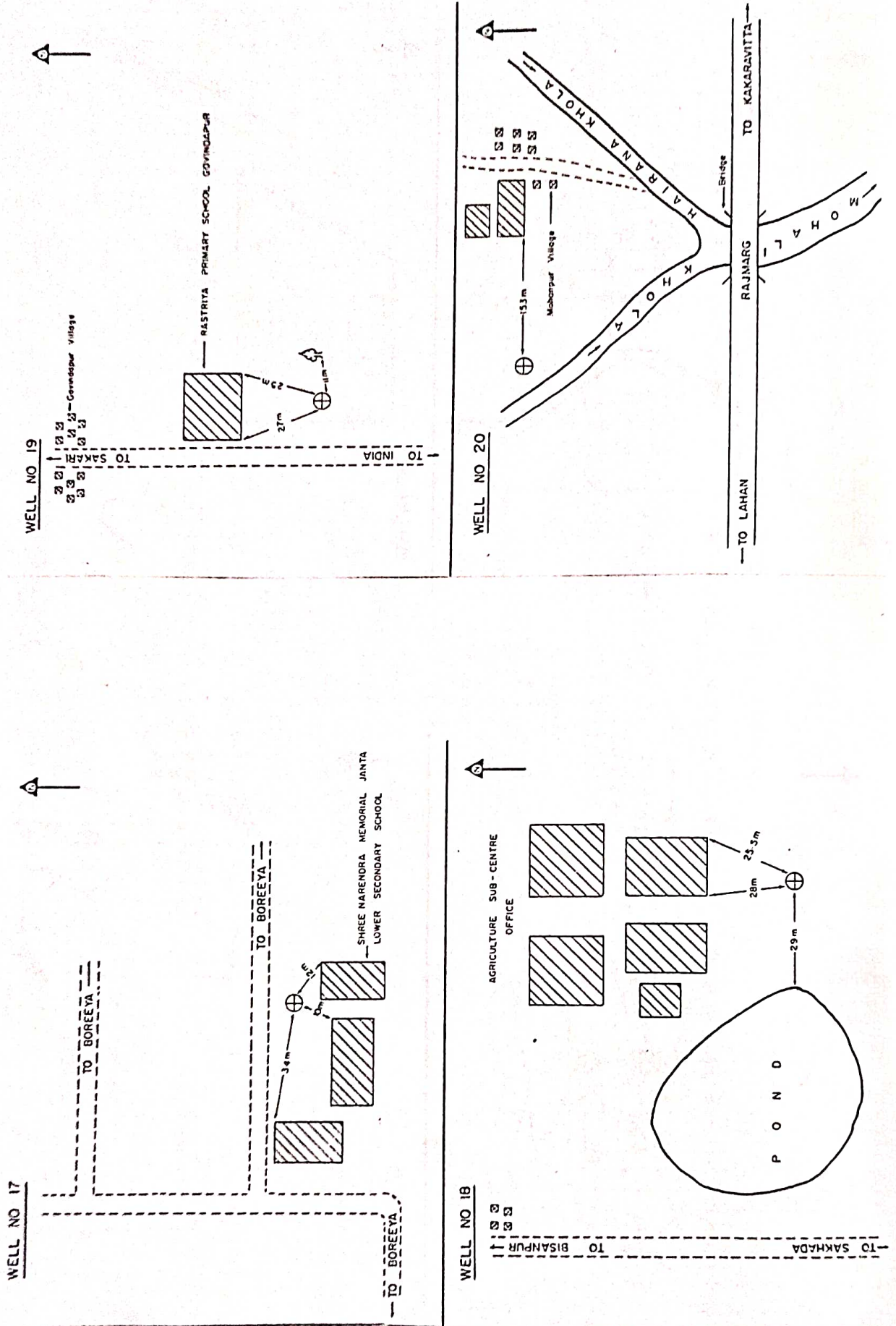


Figure 7.--Sketches of wells 17 - 20 in Saptari District.

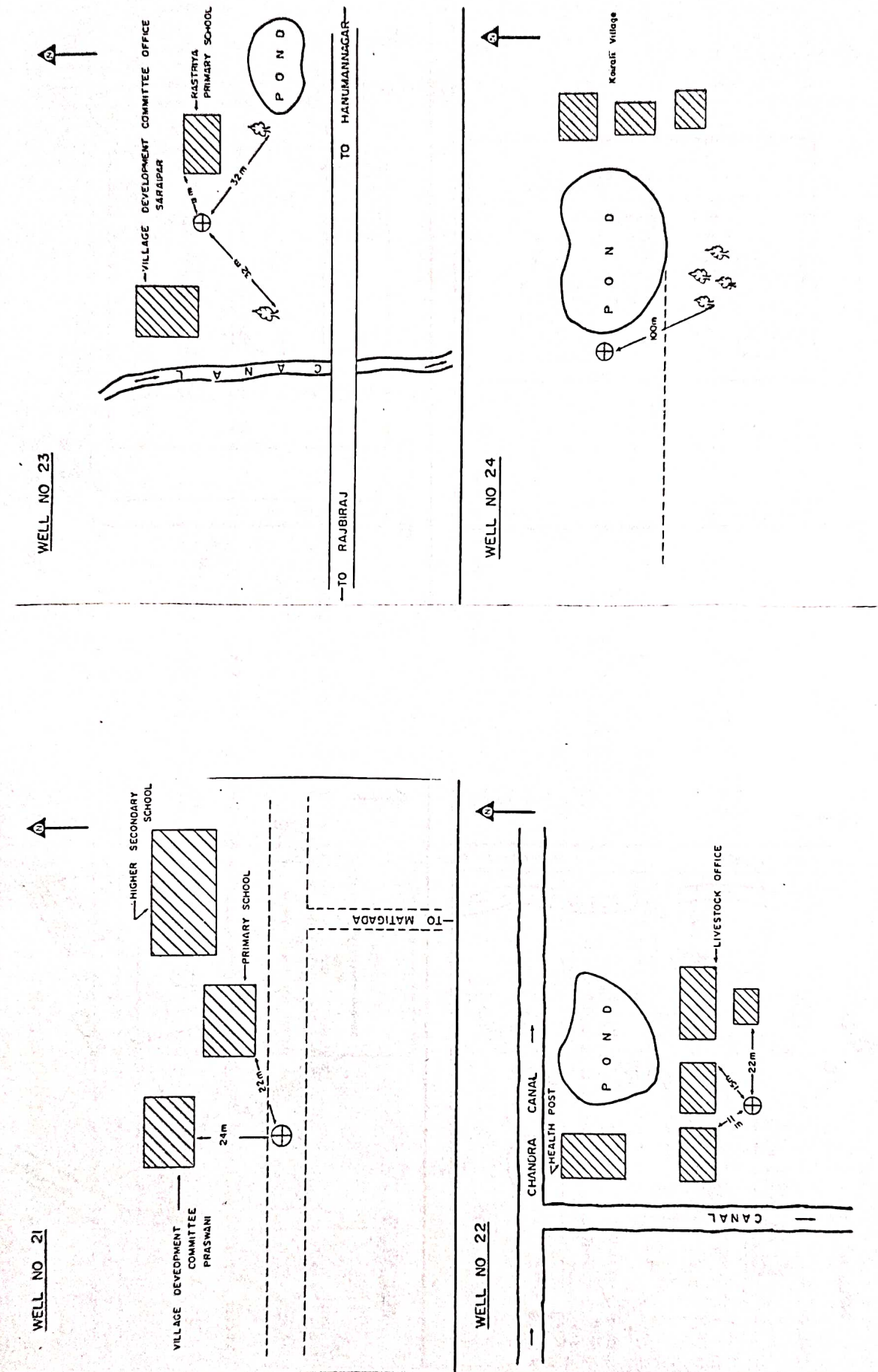


Figure 8.--Sketches of wells 21 - 24 in Saptari District.

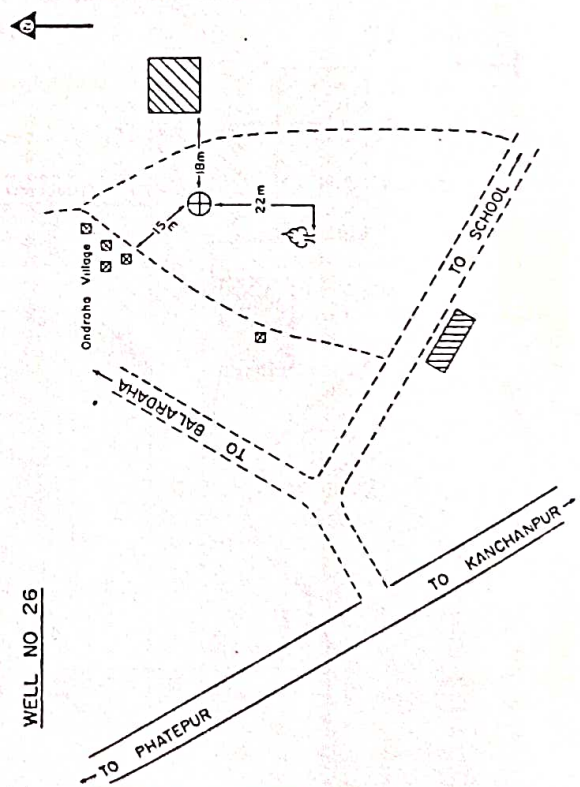
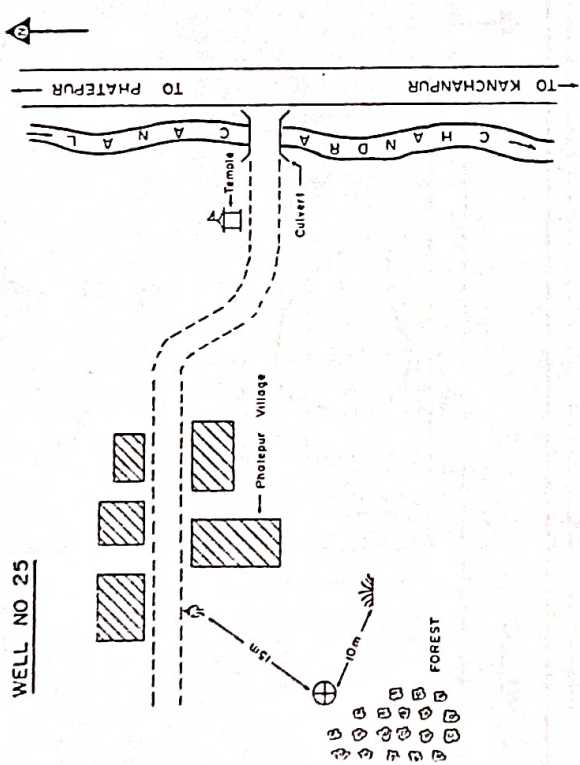
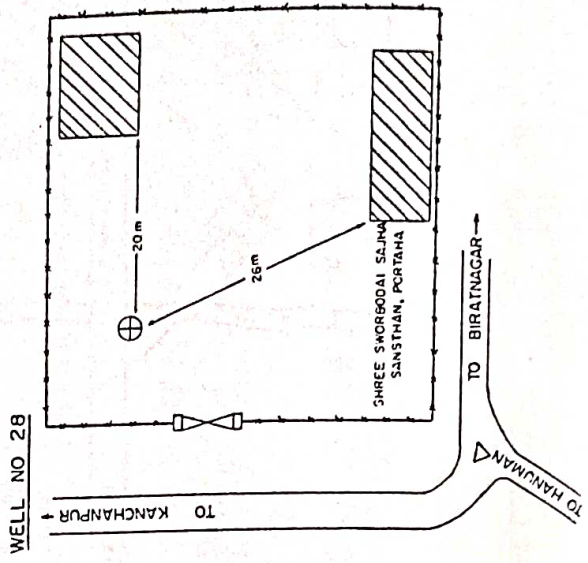
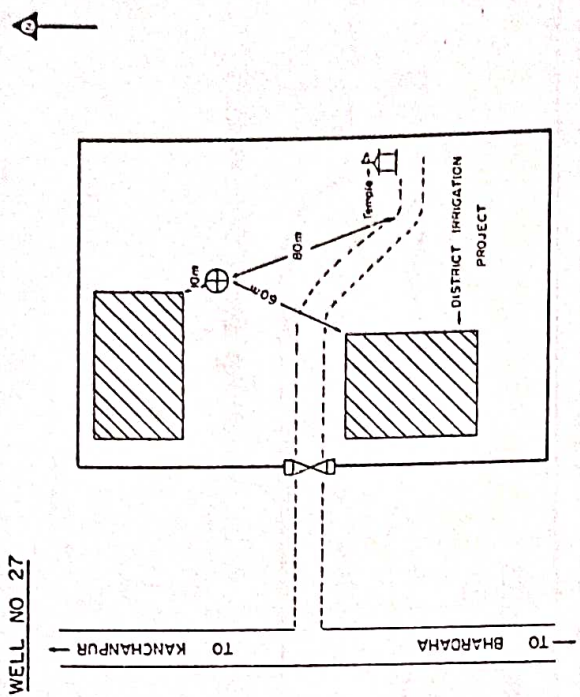


Figure 9.--Sketches of wells 25 - 28 in Saptari District.

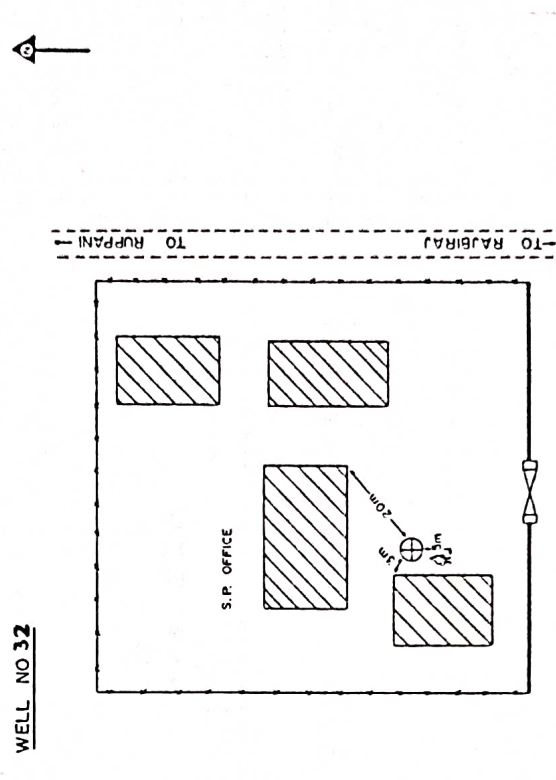
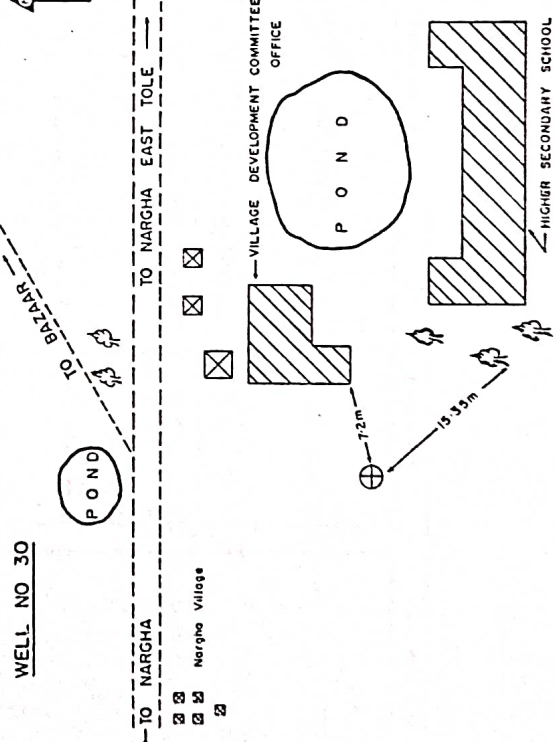
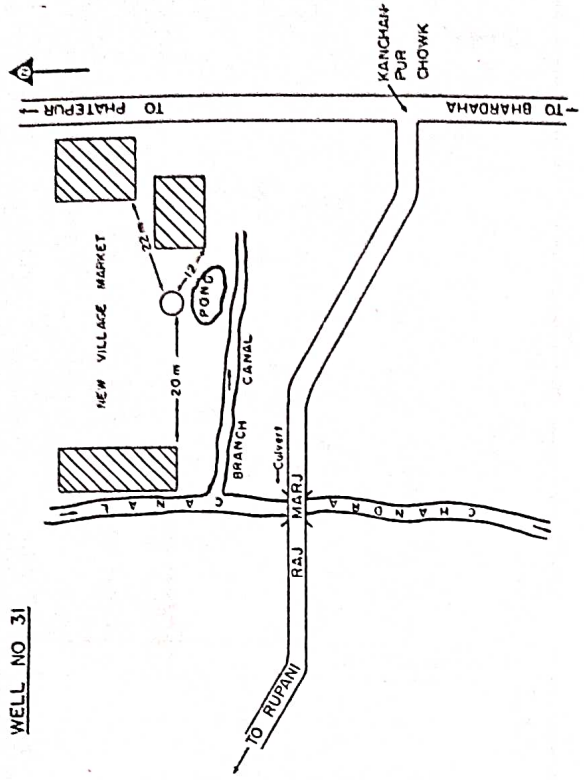
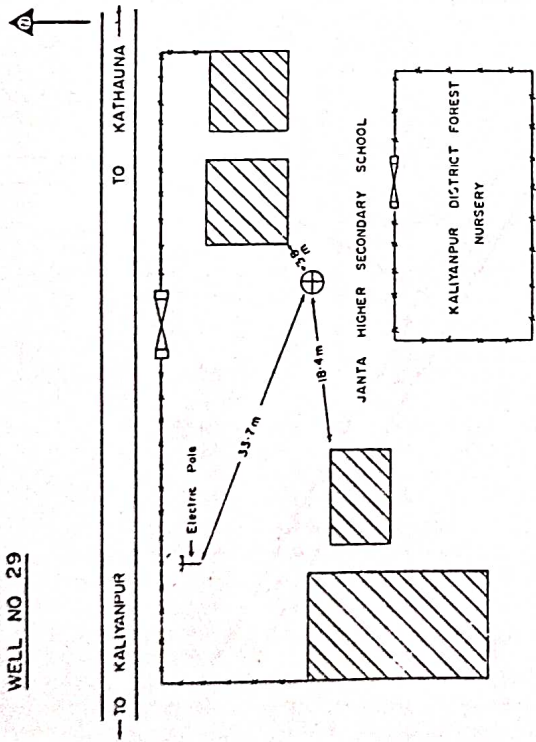


Figure 10.--Sketches of wells 29 - 32 in Saptari District.

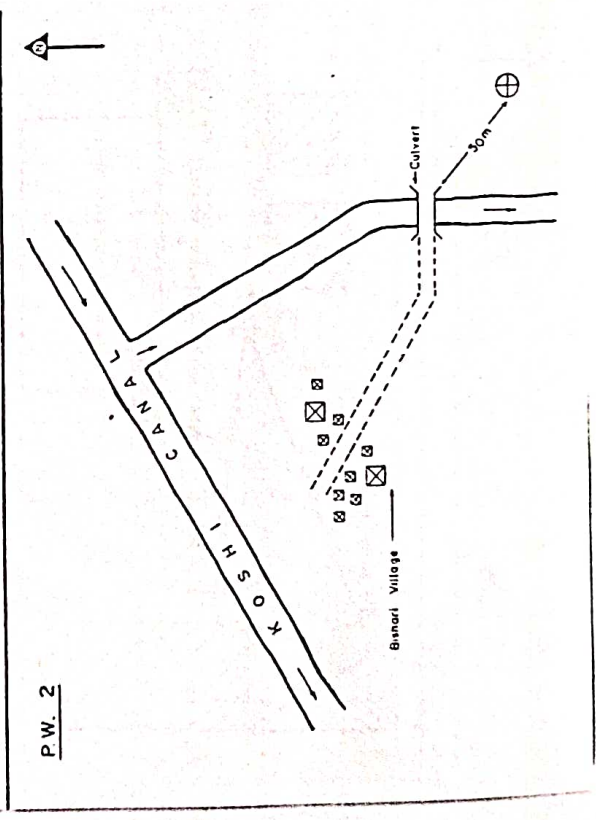
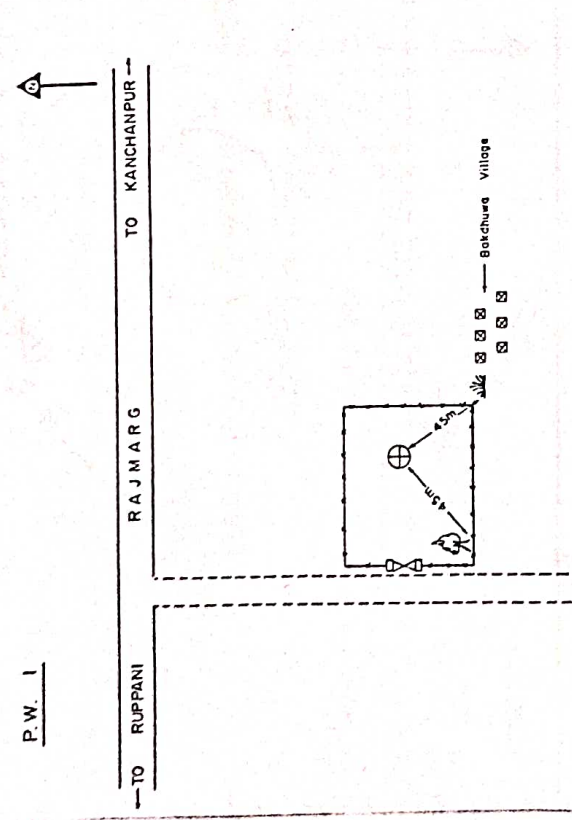
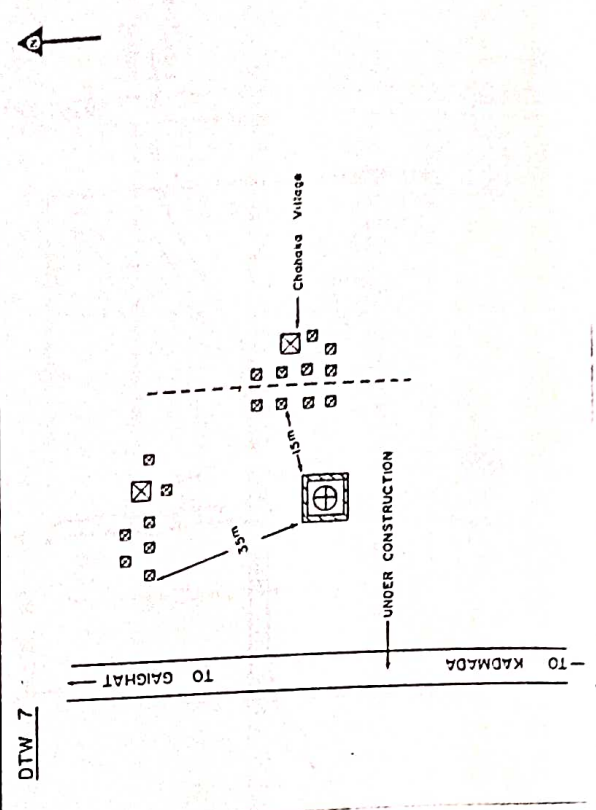
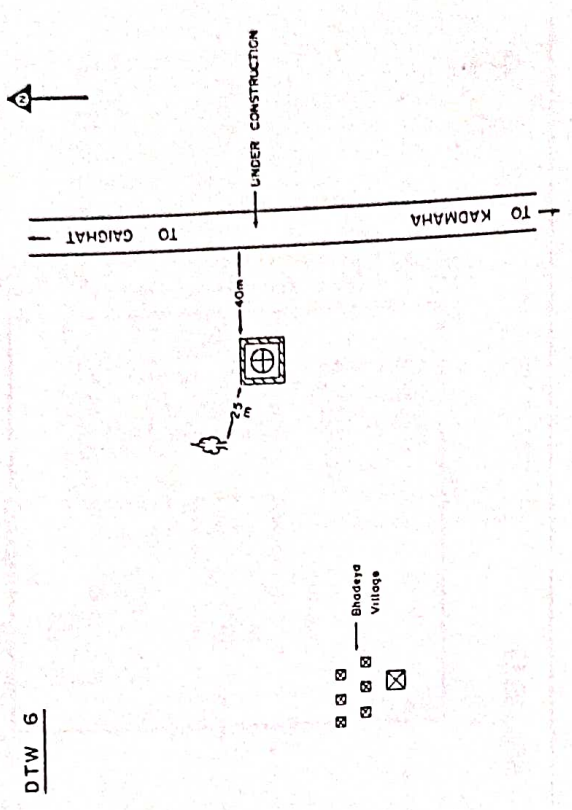


Figure 11.--Sketches of wells PW 1, 2 - DW 6, 7 in Saptari District.

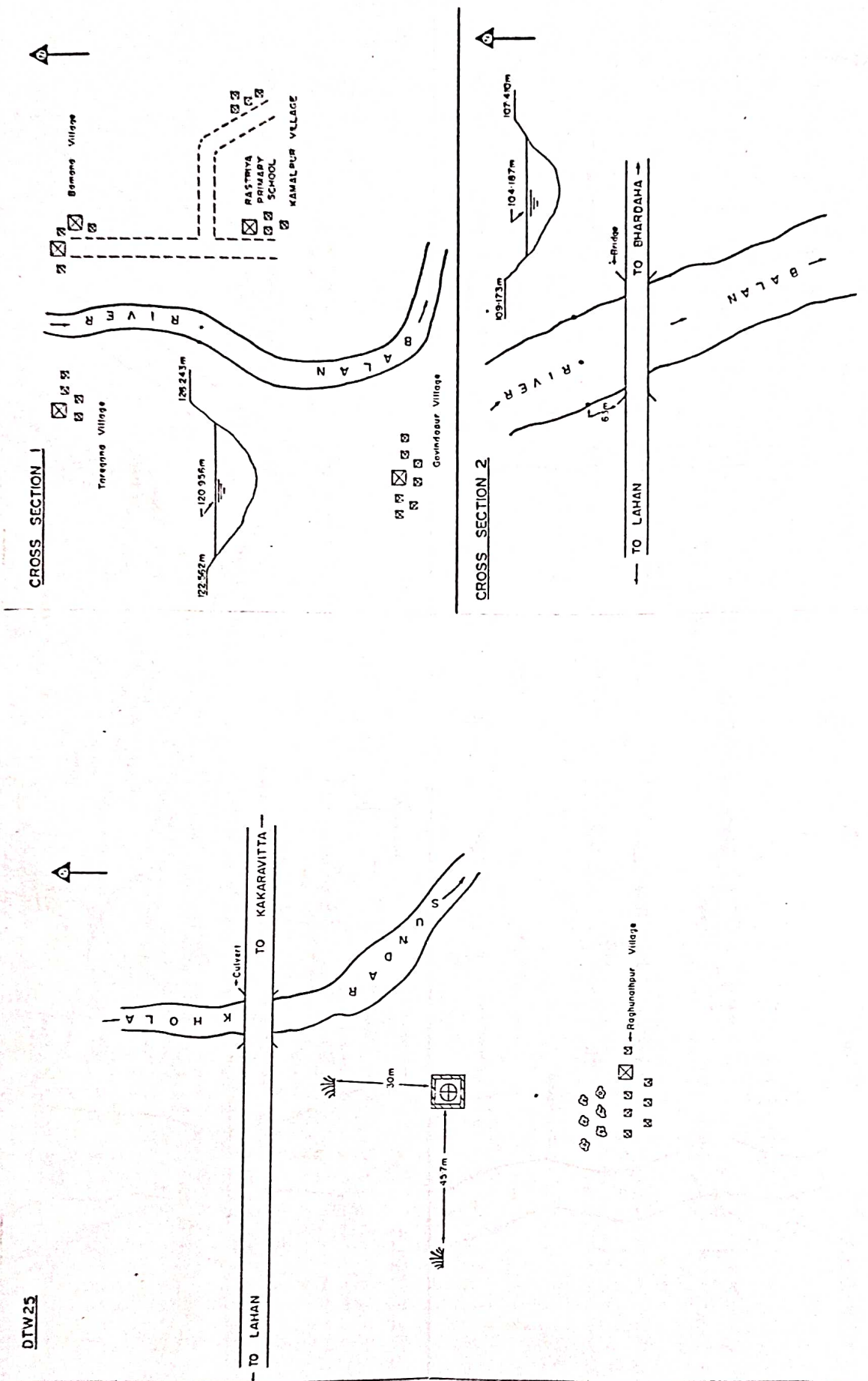
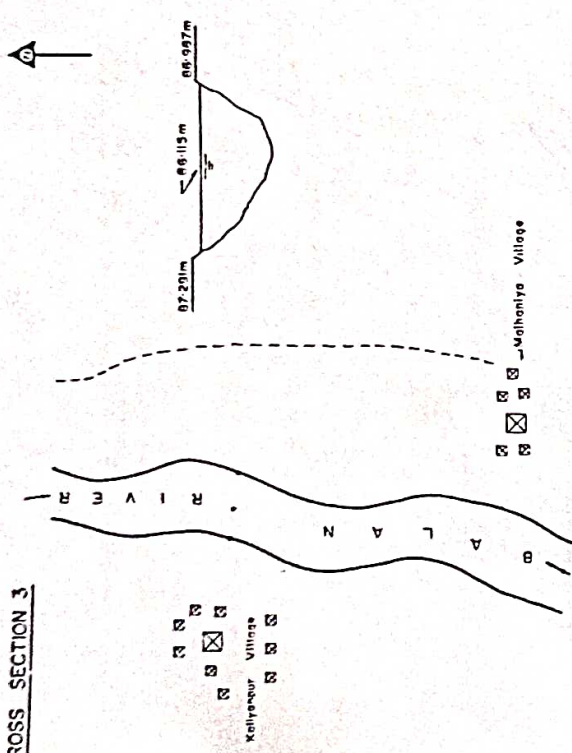
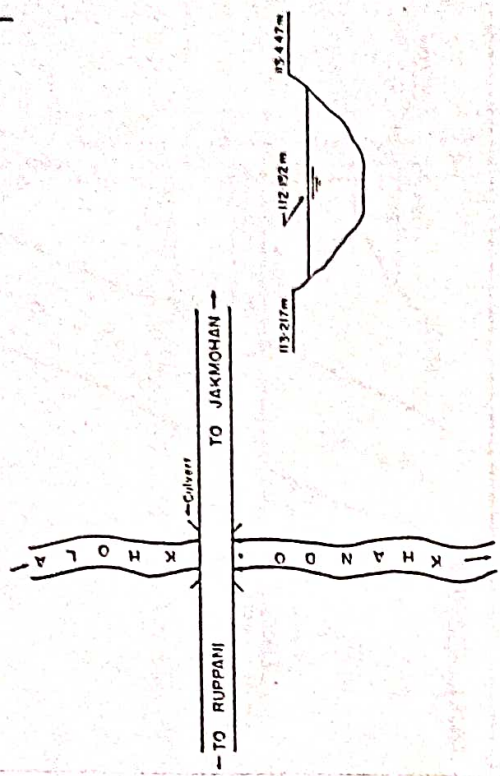


Figure 12.--Sketches of well DW 1 and sections CS 1 - 2 in Saptari District.

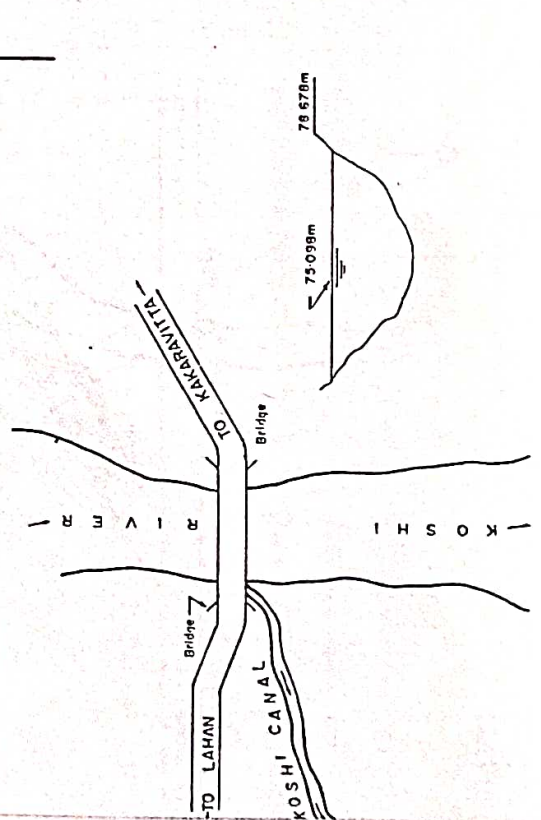
CROSS SECTION 3



CROSS SECTION 5



CROSS SECTION 4



CROSS SECTION 6

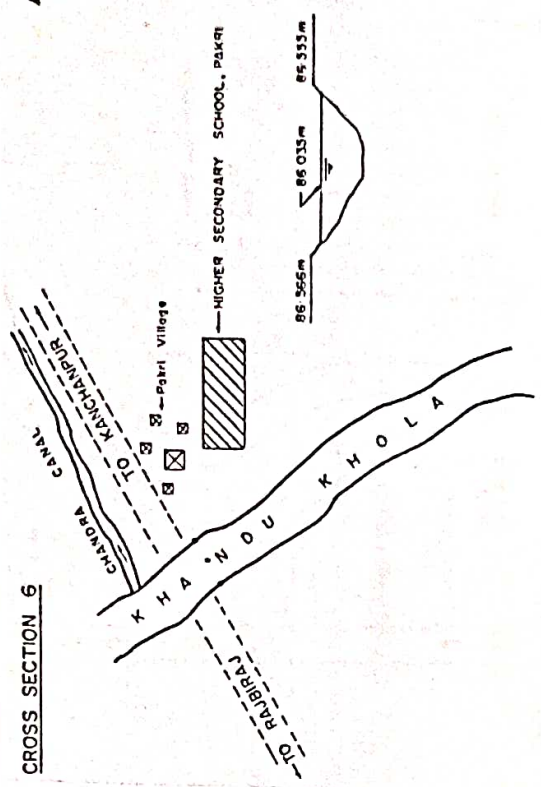
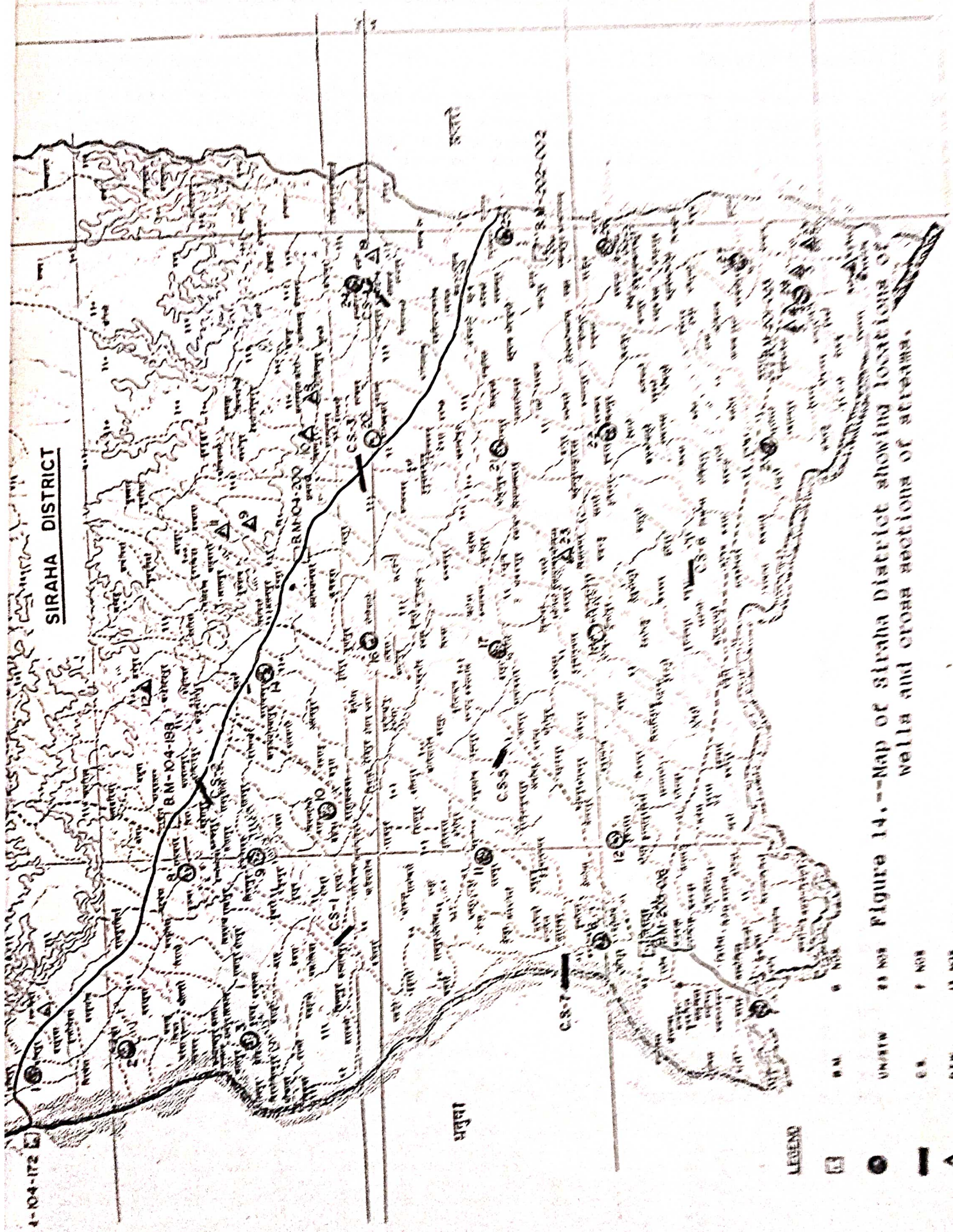


Figure 13.--Sketches of sections 3 - 6 in Saptari District.



SIRAHA DISTRICT

Figure 14.--Map of Siraha District showing locations of wells and cross sections of streams.

LEGEND

- B.N.
- UNWIN
- C.S.
- △ DTW

Siraha District

Land surface altitudes at 36 wells and the water surface altitudes at 7 stream cross sections were determined in Siraha District. There were 23 UN wells, 13 deep wells and 7 stream cross sections surveyed. Locations are shown on the district map, Figure 14; altitudes are listed in Table 2; sketches of the wells and cross sections are shown in Figures 15 - 25.

Table 2.--Well number, village or stream name, ward number, and altitude of land surface at the well or water surface in the stream in meters above sea level in Siraha District.

<u>Well Number</u>	<u>Village or Stream Name</u>	<u>Ward Number</u>	<u>Altitude of Land or Stream Surface</u>
UN 1	Bandipur	3	105.1
UN 2	Karjanaha	4	100.8
UN 3	Rampur Bhediya	8	90.4
UN 6	Kathkolba	2	75.5
UN 7	Madar	6	70.2
UN 8	Mirchaiya (Ramnagar)	9	112.2
UN 9	Mithleshwor	8	110.8
UN 10	Narha (Hanuman Chowk)	9	104.1
UN 11	Laxmipur	3	91.7
UN 12	Hakpara	9	80.1
UN 14	Chauharba	1	140.2
UN 16	Simara	9	117.5
UN 17	Barahari	9	97.8
UN 18	Pokhariya (Kabilasi)	3	87.2
UN 20	Dhangadhi	2	129.7
UN 21	Rampur	8	105.7
UN 22	Khaurkhahi (Sundarpur)	8	93.8
UN 23	Sundarpur	5	84.0
UN 24	Amhi	3	126.0
UN 25	Raghunathpur	3	109.5
UN 26	Tilbona	1	99.8
UN 27	Nahara Rigaul	6	89.8
UN 28	Pandul (Inerba)	3	85.1
DW 2	Sinuriya	6	84.8
DW 3	Mahuri/Bhagawanpur	5	87.6
DW 4	Inarwa	3	87.1
DW 5	Gumhariya	2	85.9
DW 8	Govindpur	4	160.9
DW 9	Kasna	7	154.9
DW 10	Bishnupur	5	157.8

Table 2.--Continued.

<u>Well Number</u>	<u>Village or Stream Name</u>	<u>Ward Number</u>	<u>Altitude of Land or Stream Surface</u>
DW 11	Asanpur	9	158.7
DW 12	Dharampur	6	162.3
DW 19	Bhadiaya Nagar	1	95.8
DW 23	Bhadaiya	2	123.8
DW 27	Bhagwanpur	3	87.2
DW 29	Bhulkaiya	5	118.5
CS 1	Ghurmi Khola		88.6
CS 2	Ghurmi Khola		121.1
CS 3	Baburam Khola		127.5
CS 4	Khutti Dhar		117.8
CS 5	Mainabati		90.4
CS 6	Trisuli River		77.4
CS 7	Kamala River		74.8

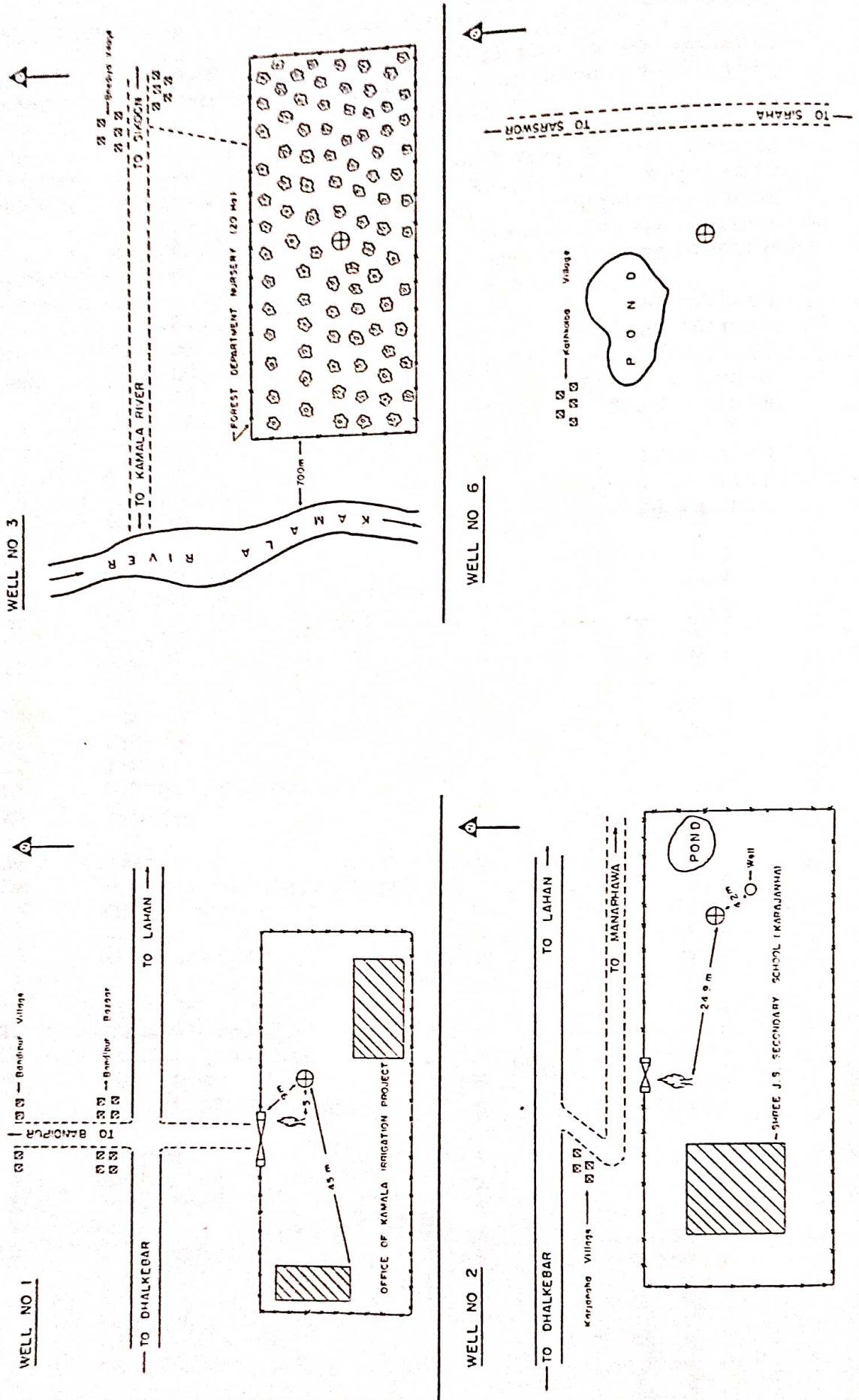


Figure 15.--Sketches of wells 1 - 3, 6 in Siraha District.

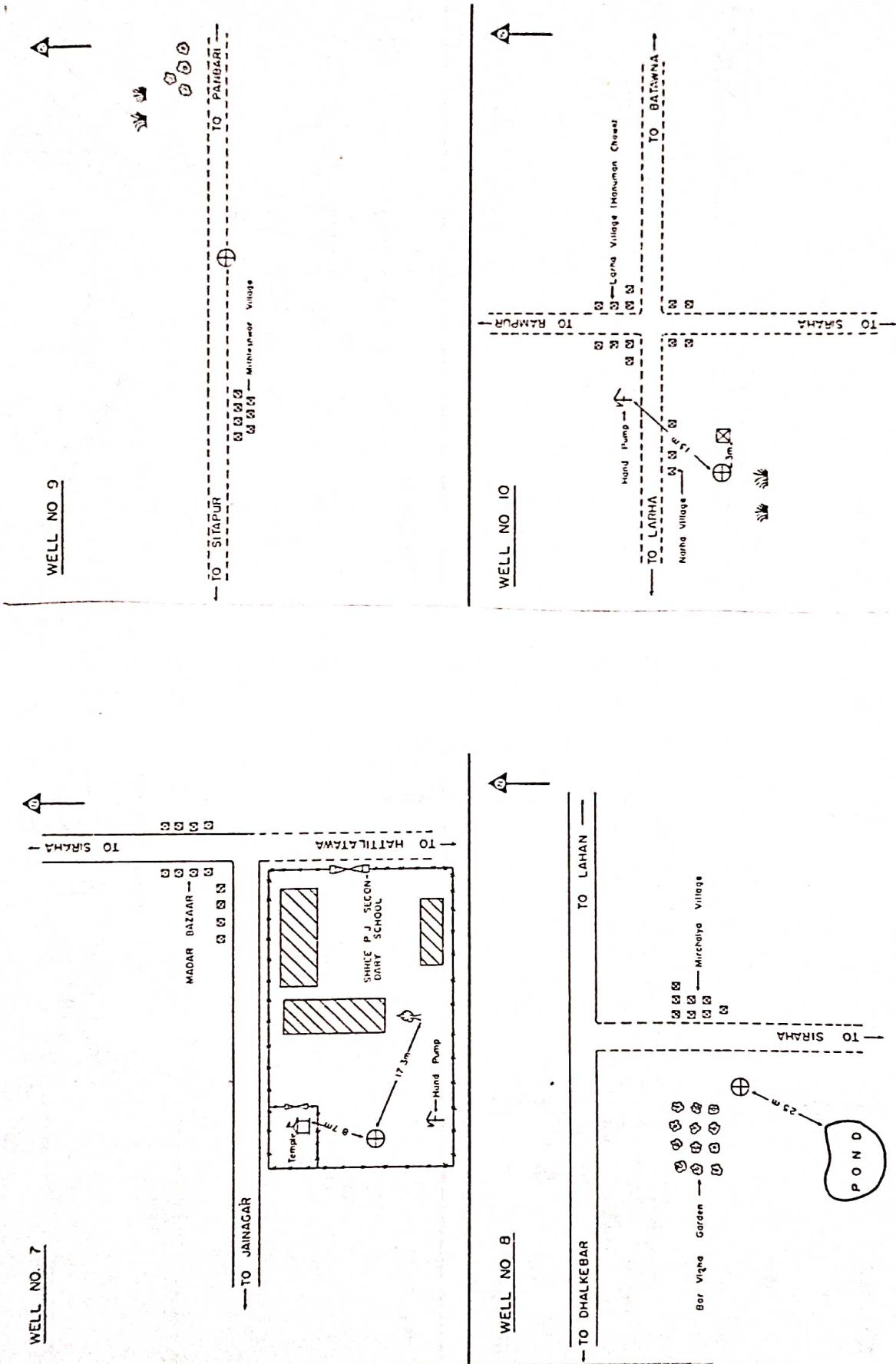


Figure 16.--Sketches of wells 7 - 10 in Siraha District.

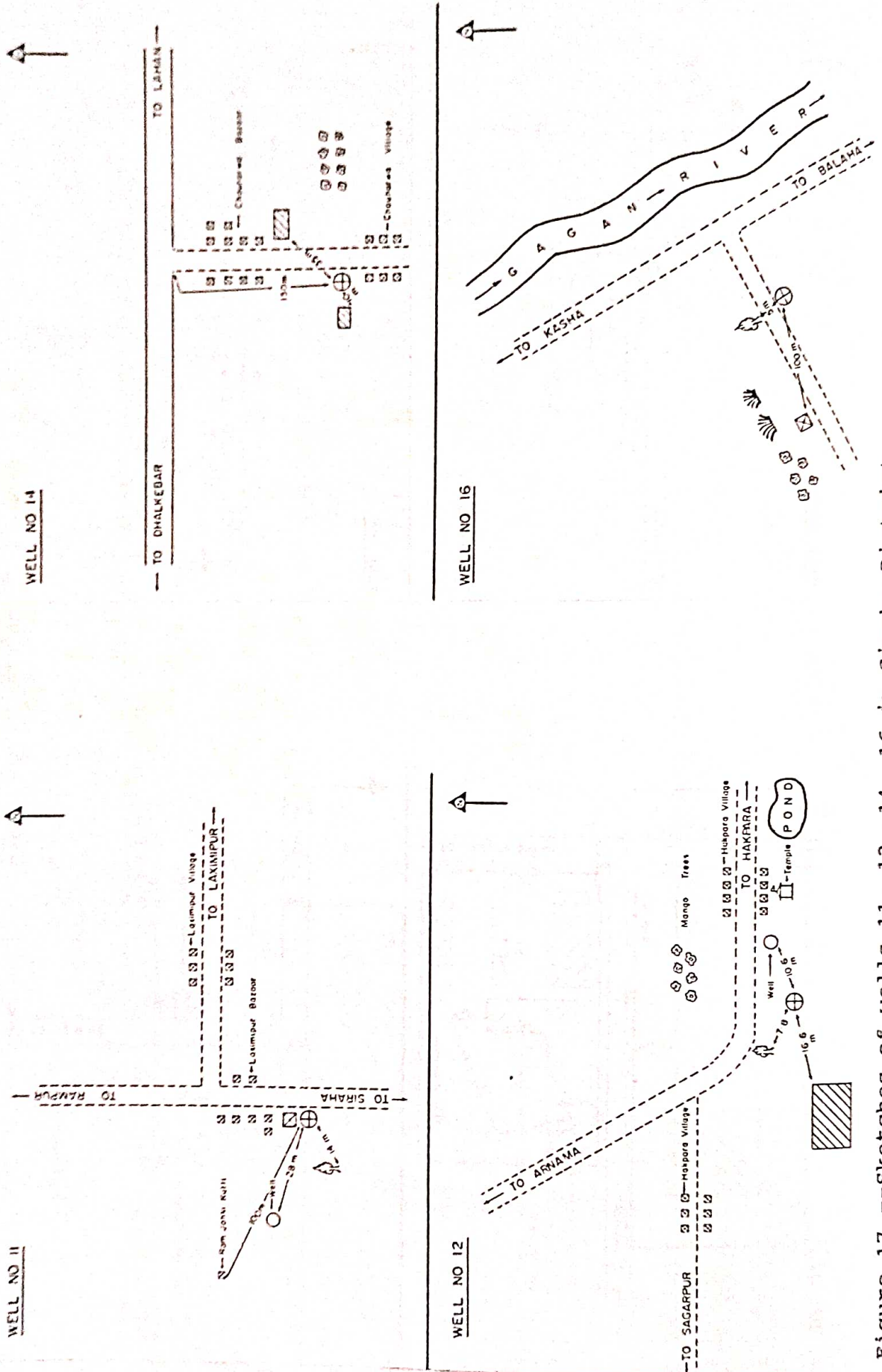


Figure 17.--Sketches of wells 11, 12, 14, 16 in Siraha District.

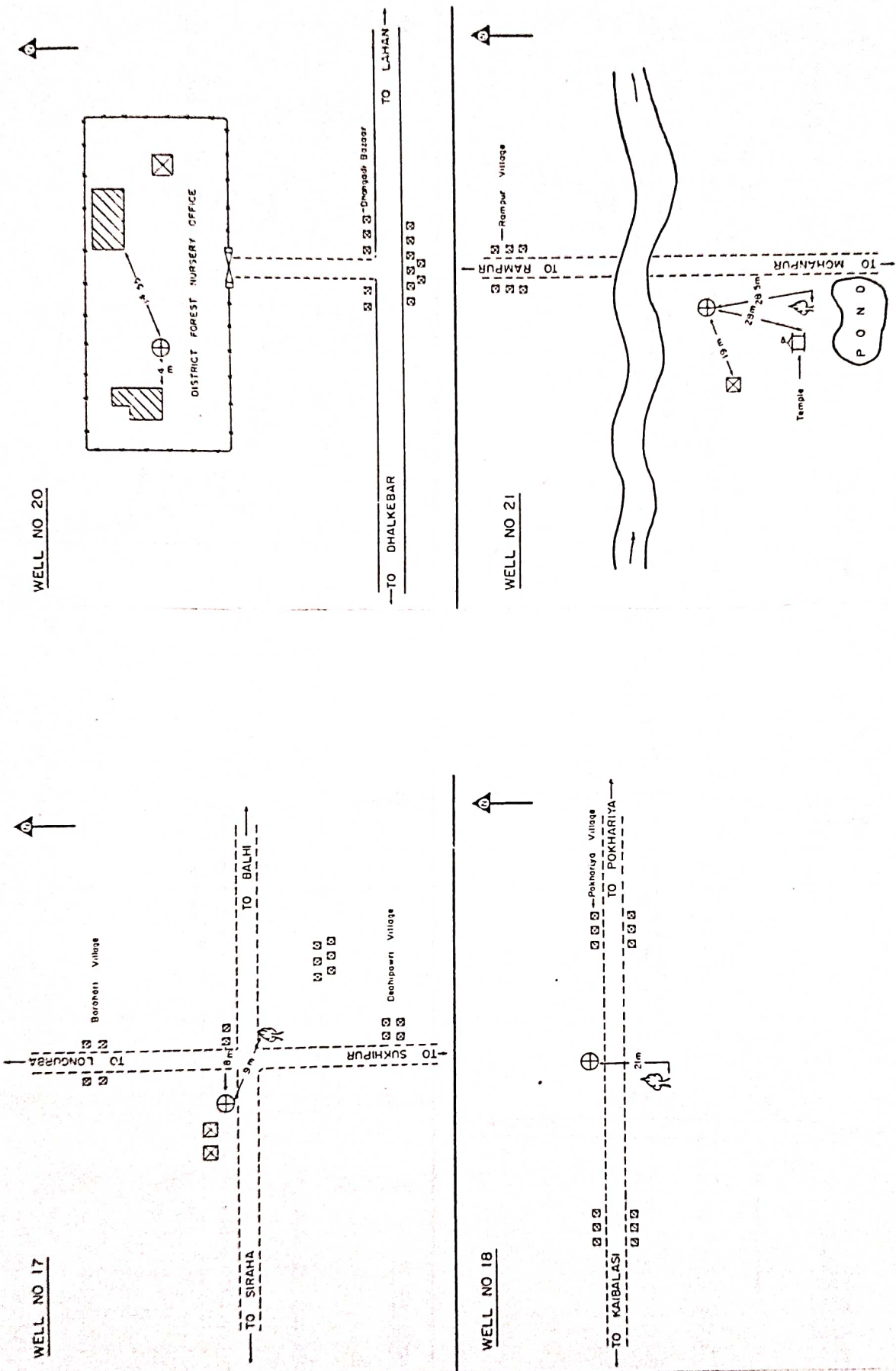


Figure 18.--Sketches of wells 17, 18, 20, 21 in Siraha District.

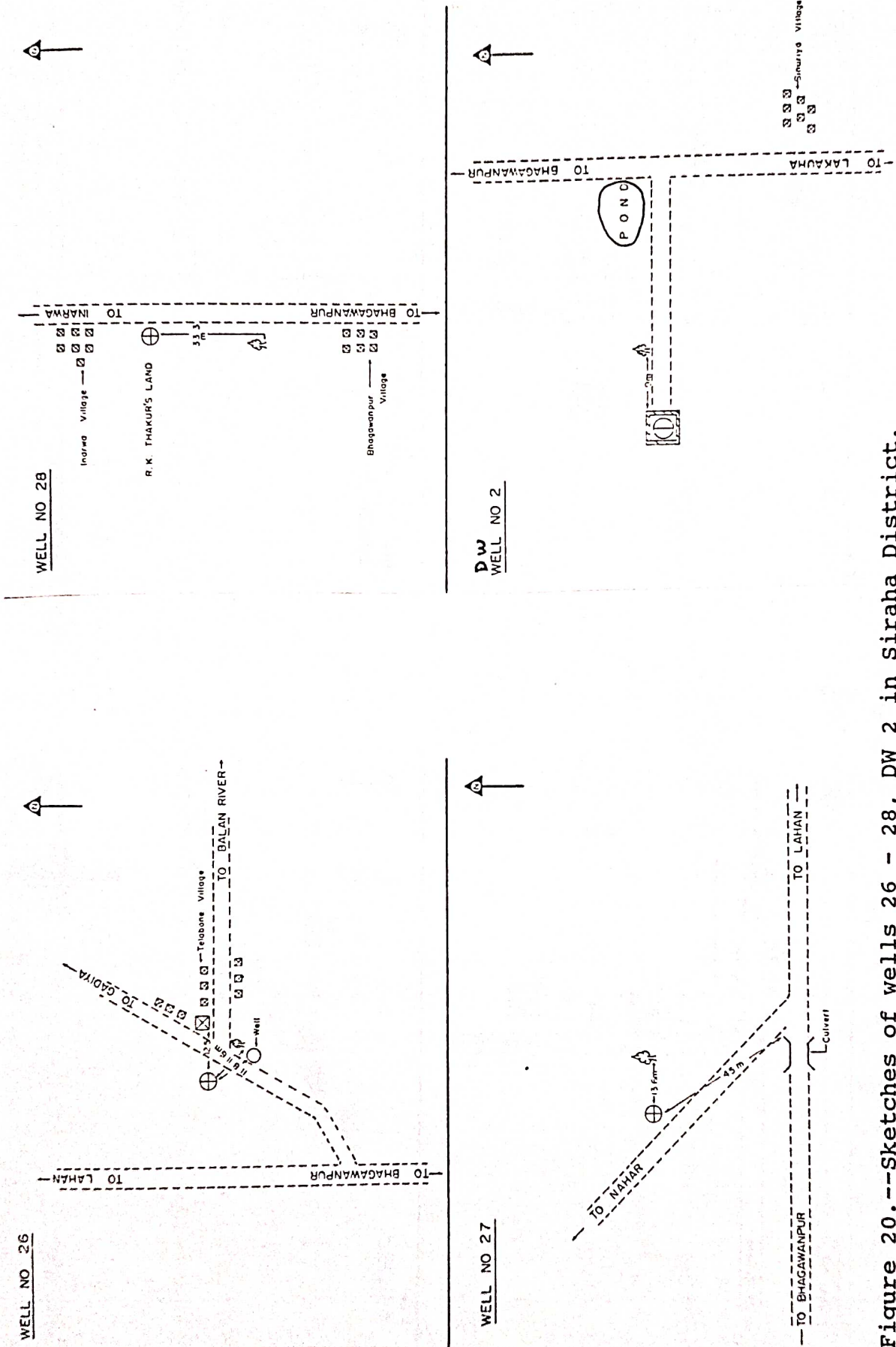


Figure 20.--Sketches of wells 26 - 28, DW 2 in Siraha District.

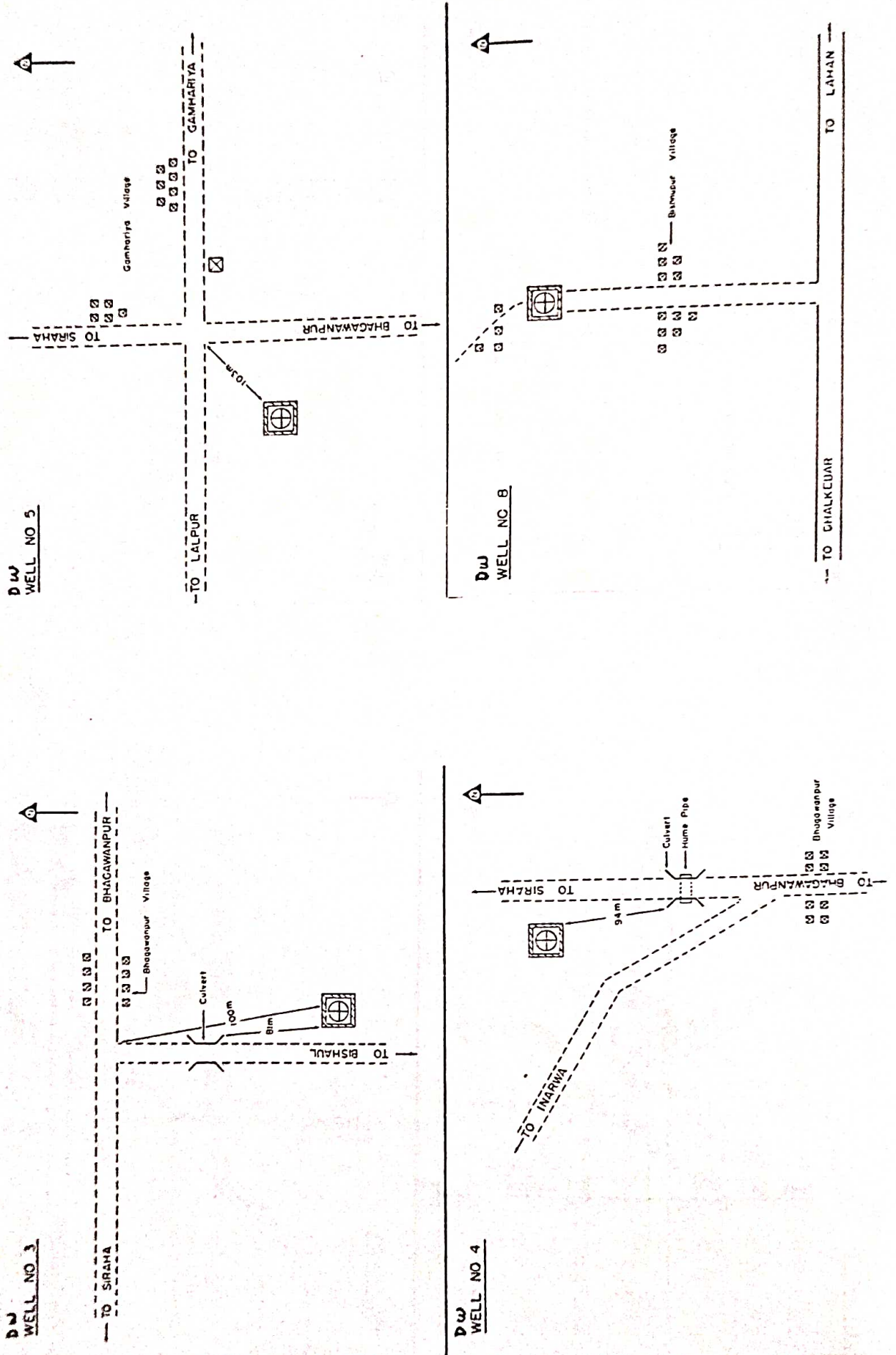


Figure 21.--Sketches of wells DW 3 - 5, 8 in Siraha District.

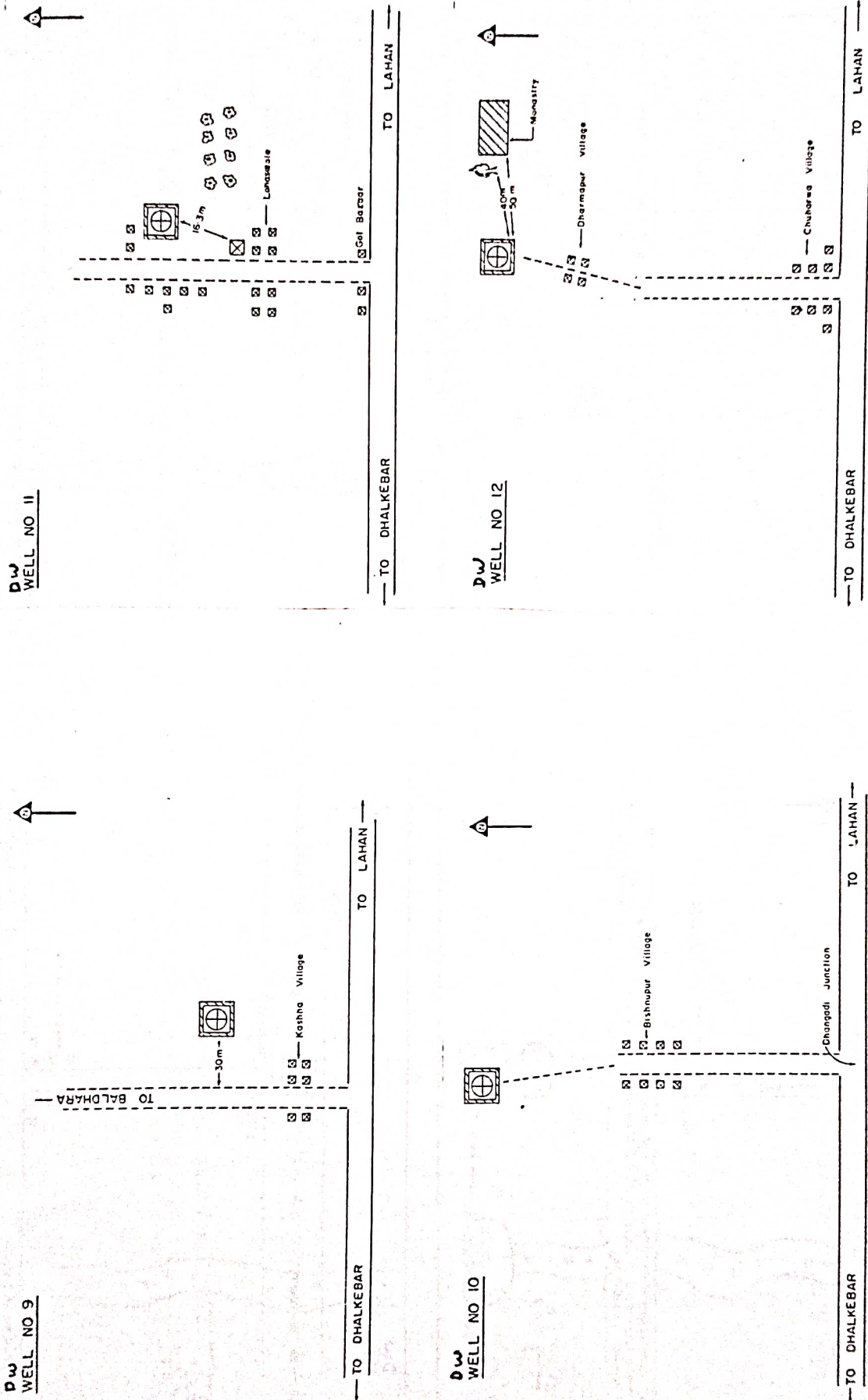


Figure 22.--Sketches of wells DW 9 - 12 in Siraha District.

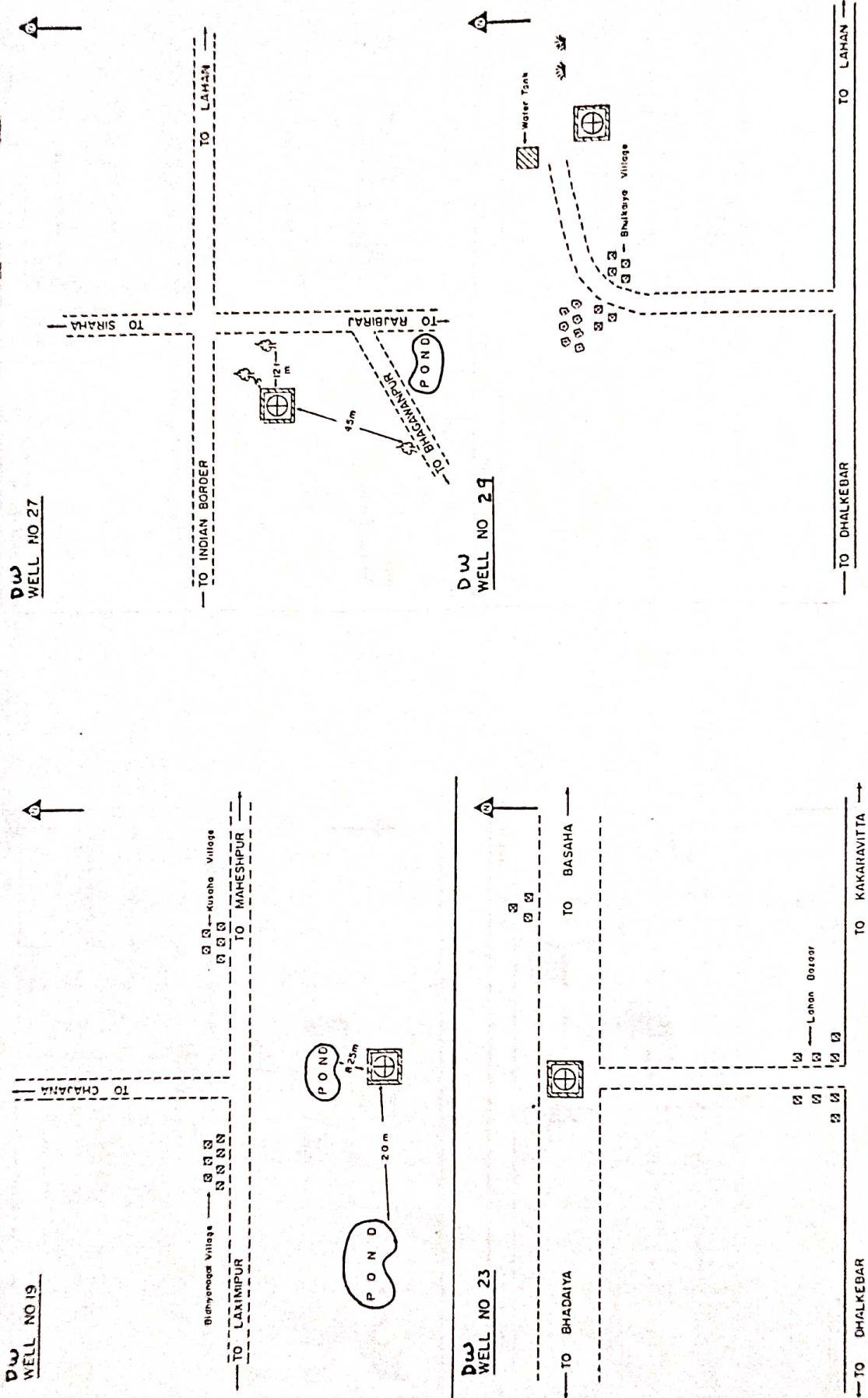


Figure 23.--Sketches of wells DW 19, 23, 27, 29 in Siraha District.

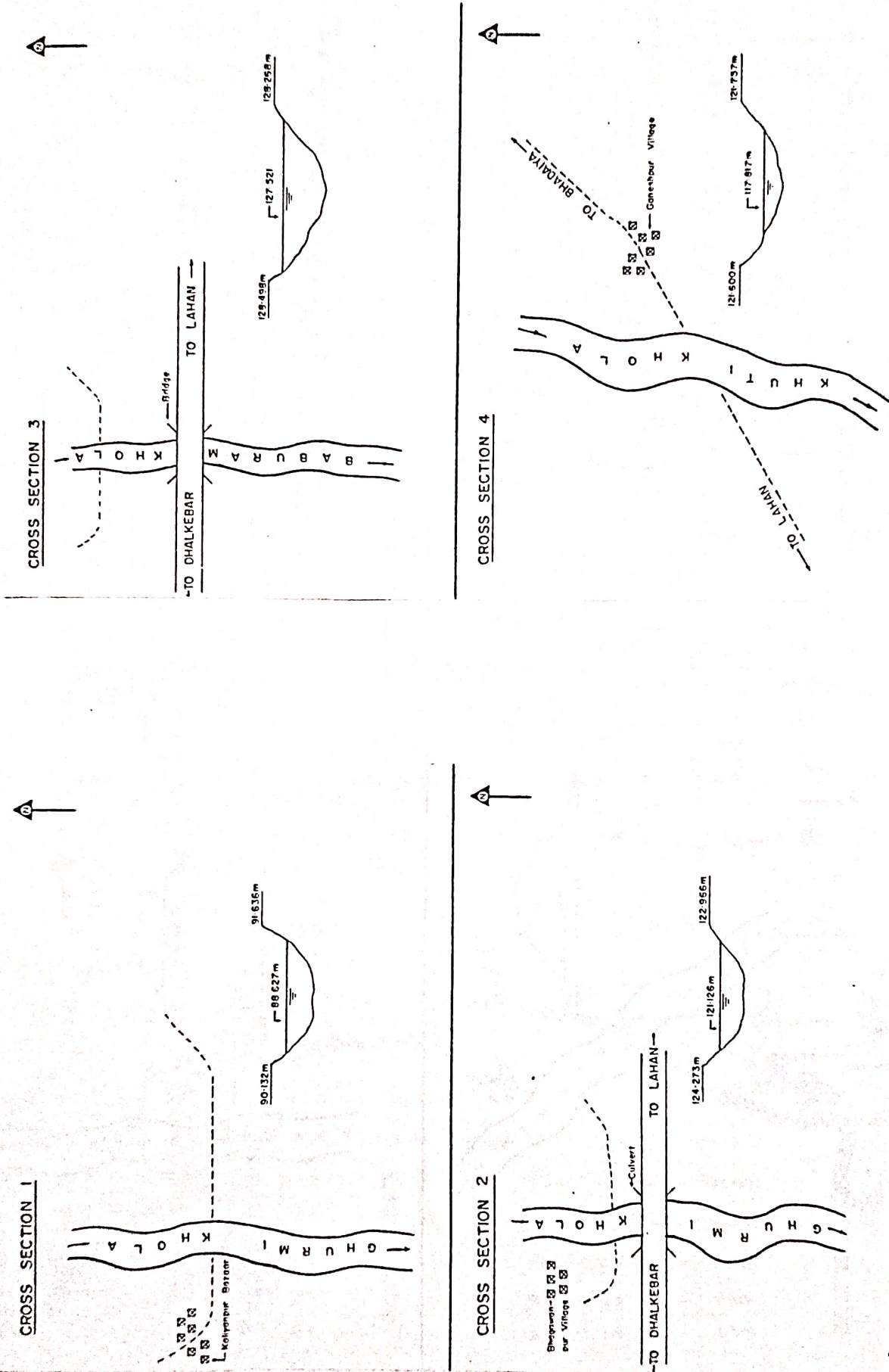


Figure 24.--Sketches of sections 1 - 4 in Siraha District.

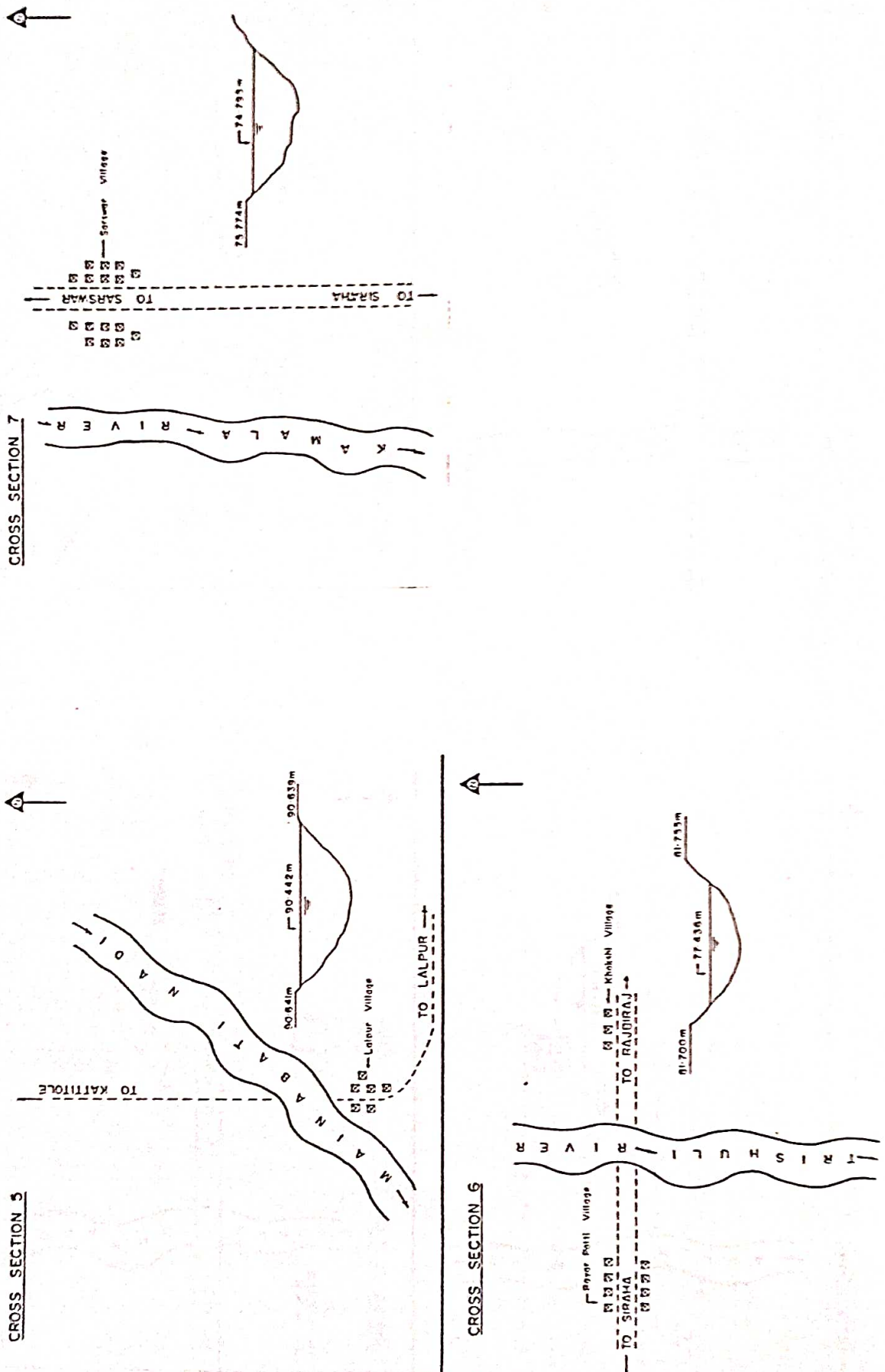


Figure 25.--Sketches of sections 5 - 7 in Siraha District.

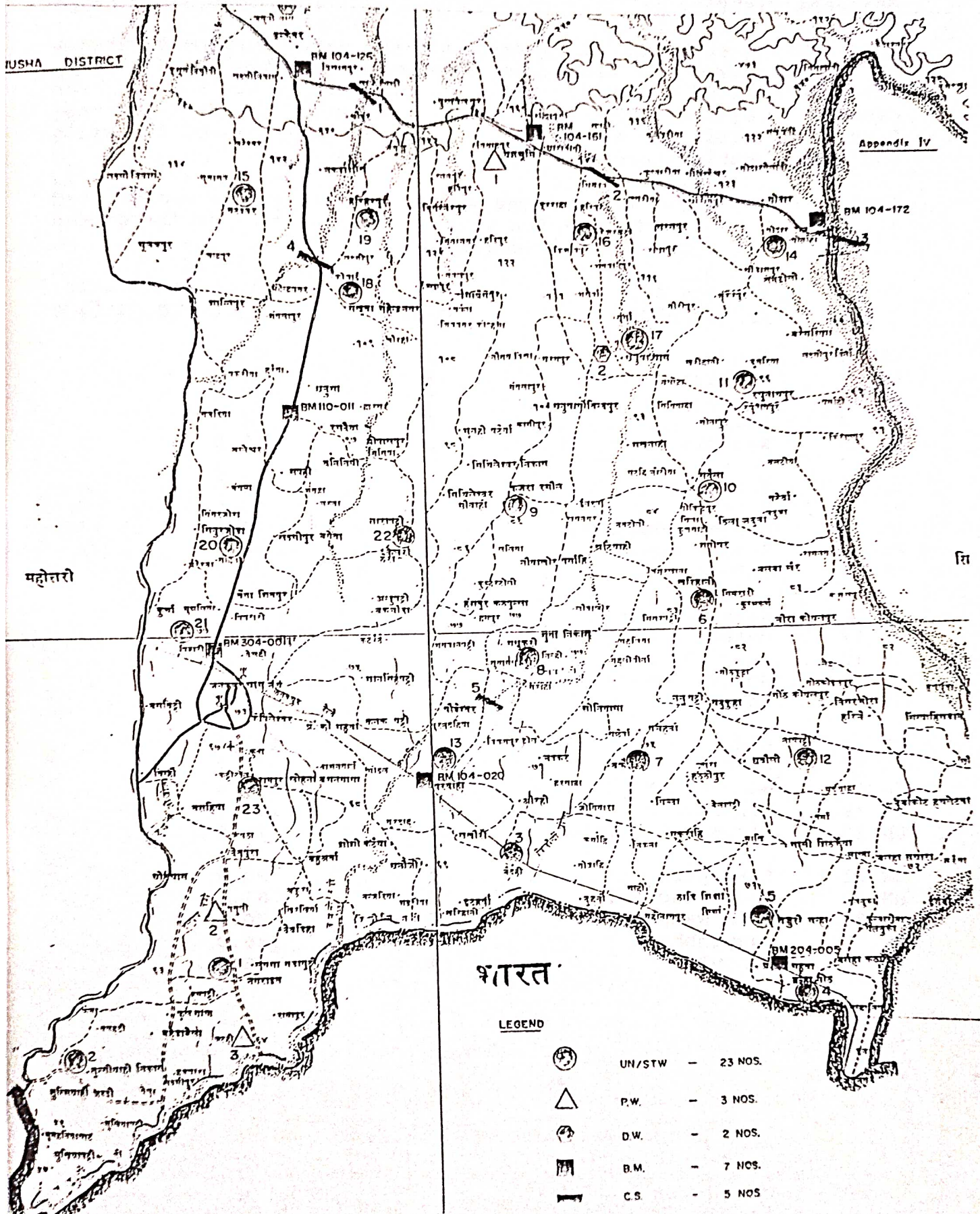


Figure 26.--Map of Dhanusha District showing locations of wells and cross sections of streams.

Dhanusha District

Land surface altitudes at 25 wells and the water surface altitudes at 5 stream cross sections were determined in Dhanusha District. There were 23 UN wells, 3 private wells, 2 dug wells and 5 stream cross sections surveyed. Locations are shown on the district map, Figure 26; altitudes are listed in Table 3; sketches of the wells and cross sections are shown in Figures 27 - 35.

Table 3.--Well number, village or stream name, ward number, and altitude of land surface at the well or water surface in the stream in meters above sea level in Dhanusha District.

<u>Well Number</u>	<u>Village or Stream Name</u>	<u>Ward Number</u>	<u>Altitude of Land or Stream Surface</u>
UN 1	Nagarain	1	64.6
UN 2	Tulsiyahi Jabdi	9	61.3
UN 3	Badhehi	3	70.5
UN 4	Balra	5	69.9
UN 5	Khajuri	2	69.6
UN 6	Khariyani	3	82.6
UN 7	Baphai	6	73.5
UN 8	Sangam (Radauli)	4	74.9
UN 9	Kajara Ramul	4	90.4
UN 10	Sabaila		87.8
UN 11	Raghunathpur		96.3
UN 12	Dhabauli	2	79.1
UN 13	Deuri Prabah	6	71.0
UN 14	Godar, Ghyampalitole		115.0
UN 15	Bateswar		145.2
UN 16	Kishanpur		121.3
UN 17	Dhanusha Dham		97.2
UN 18	Mahendra Nagar		111.8
UN 19	Hariharpur Durgatole		124.3
UN 20	Pirarifield Tole	13	76.8
UN 21	Laxmipur	5	90.9
UN 22	Thera Kacheri	3	85.0
UN 23	Kuwa Rampur	12	70.6
PW 1	Yagyanbhumi	5	149.0
PW 2	Ganguli	7	65.4

Table 3.--Continued.

<u>Well Number</u>	<u>Village or Stream Name</u>	<u>Ward Number</u>	<u>Altitude of Land or Stream Surfac</u>
PW 3	Jatahi	8	63.8
DG 1	Dhalke	4	176.3
DG 2	Dhanushadham	3	96.0
CS 1	Aurhi Khola		162.8
CS 2	Balwa Khola		138.3
CS 3	Kamala Nadi		109.9
CS 4	Aurhi Khola		119.5
CS 5	Bhus Khola		72.5

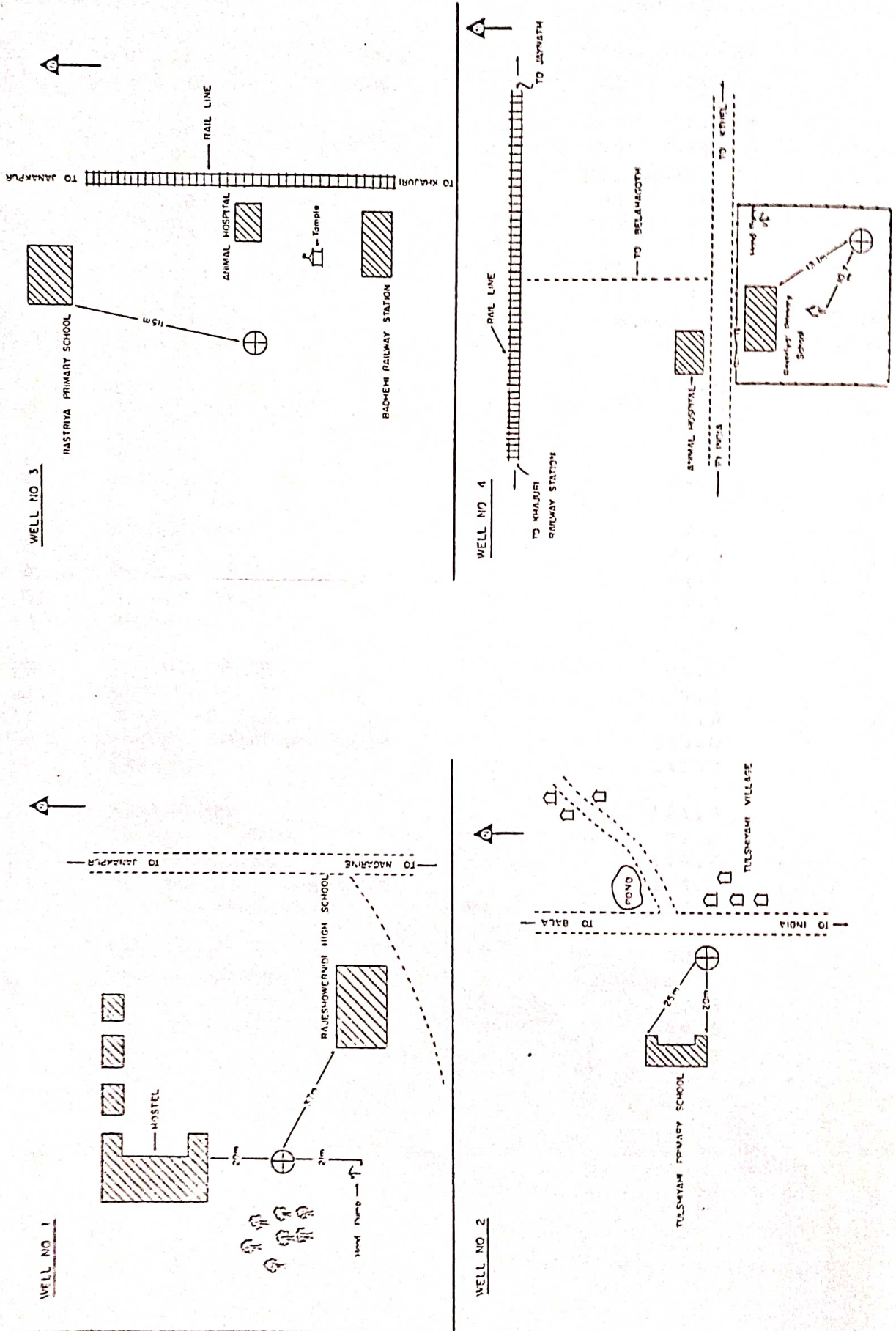


Figure 27.--Sketches of wells 1 - 4 in Dhanusha District.

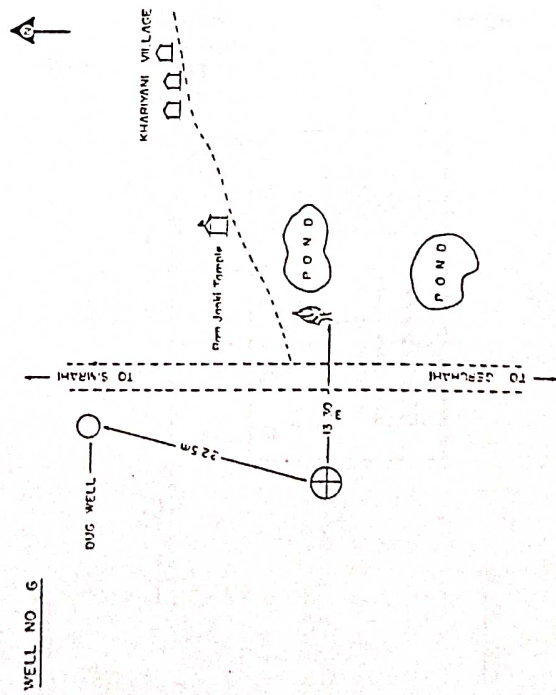
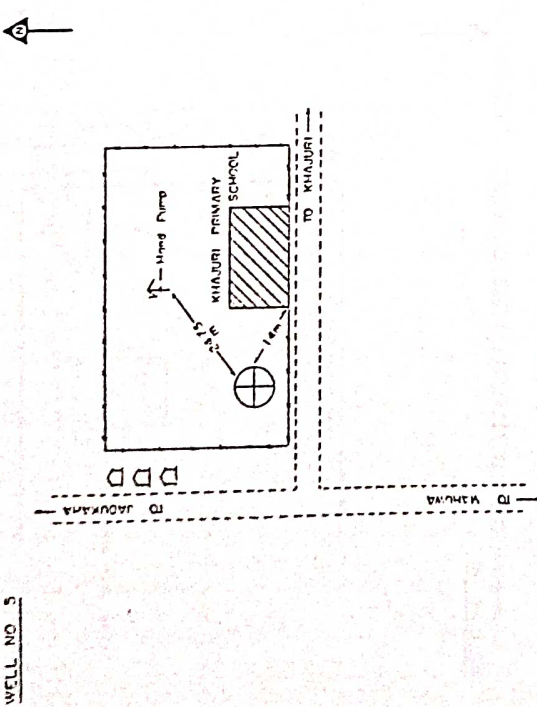
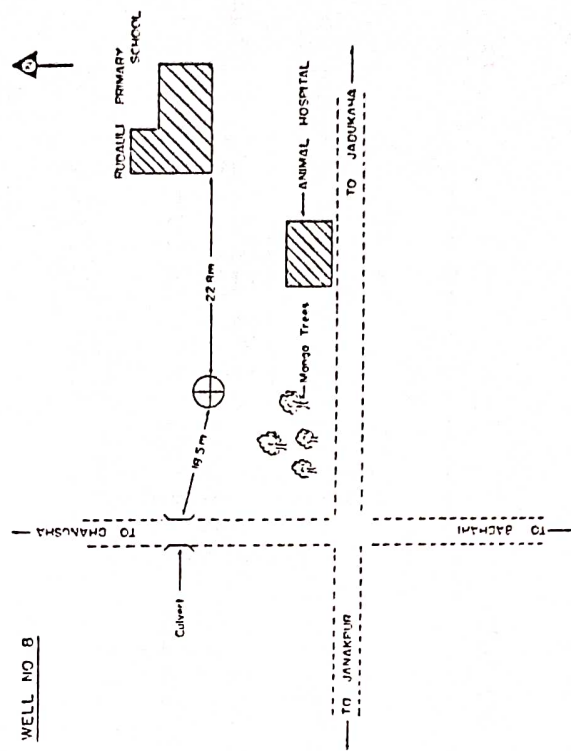
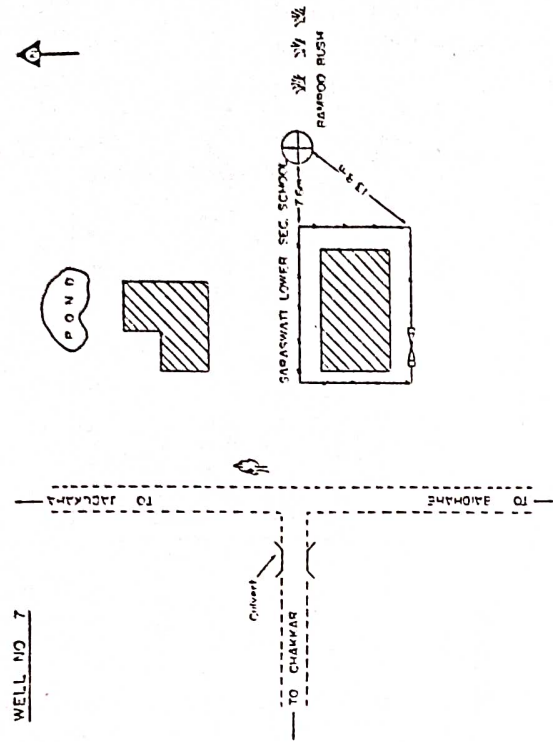


Figure 28.--Sketches of wells 5 - 8 in Dhanusha District.

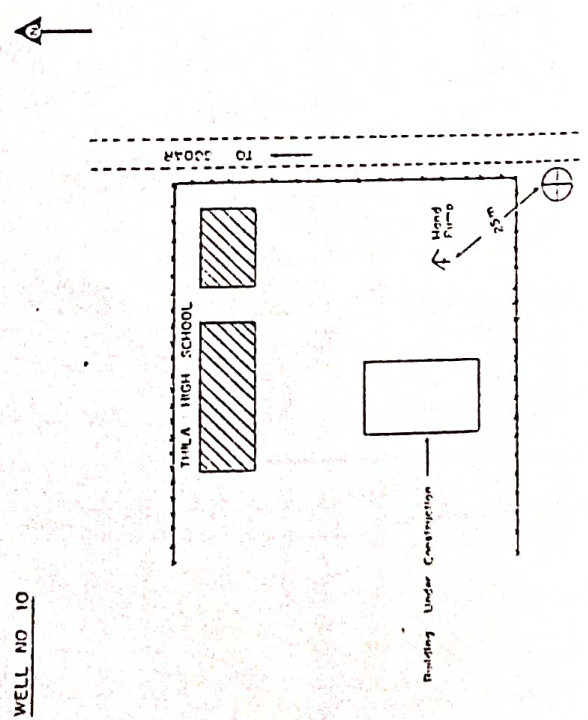
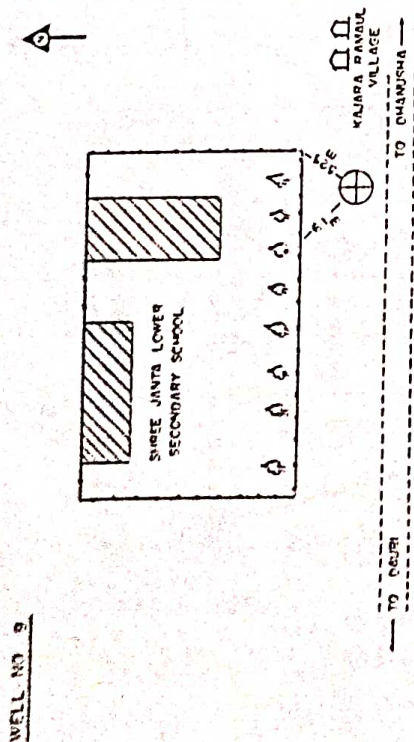
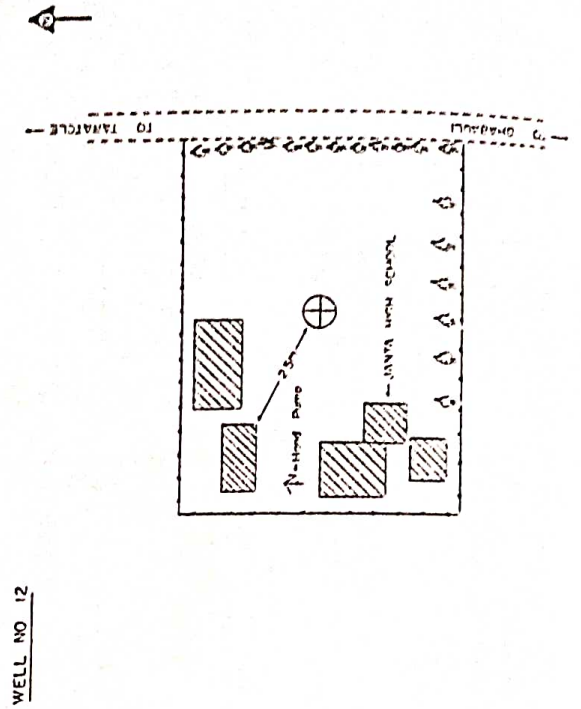
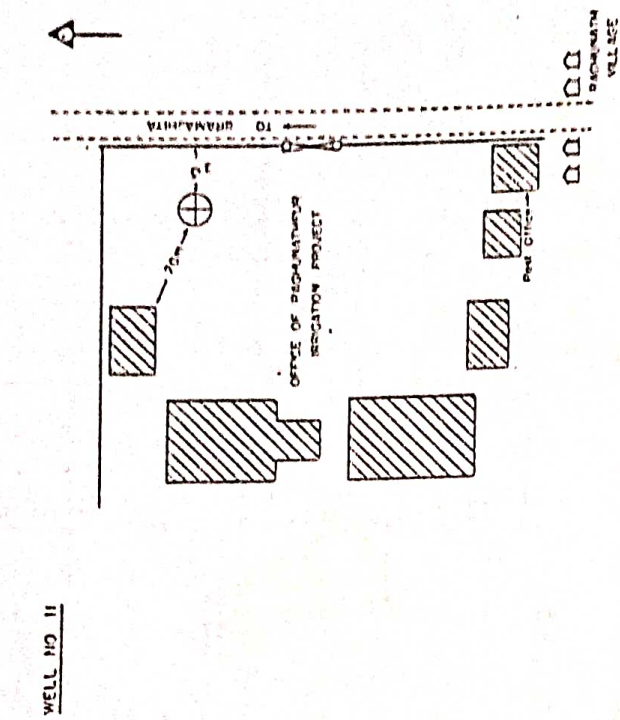


Figure 29.--Sketches of wells 9 - 12 in Dhanusha District.

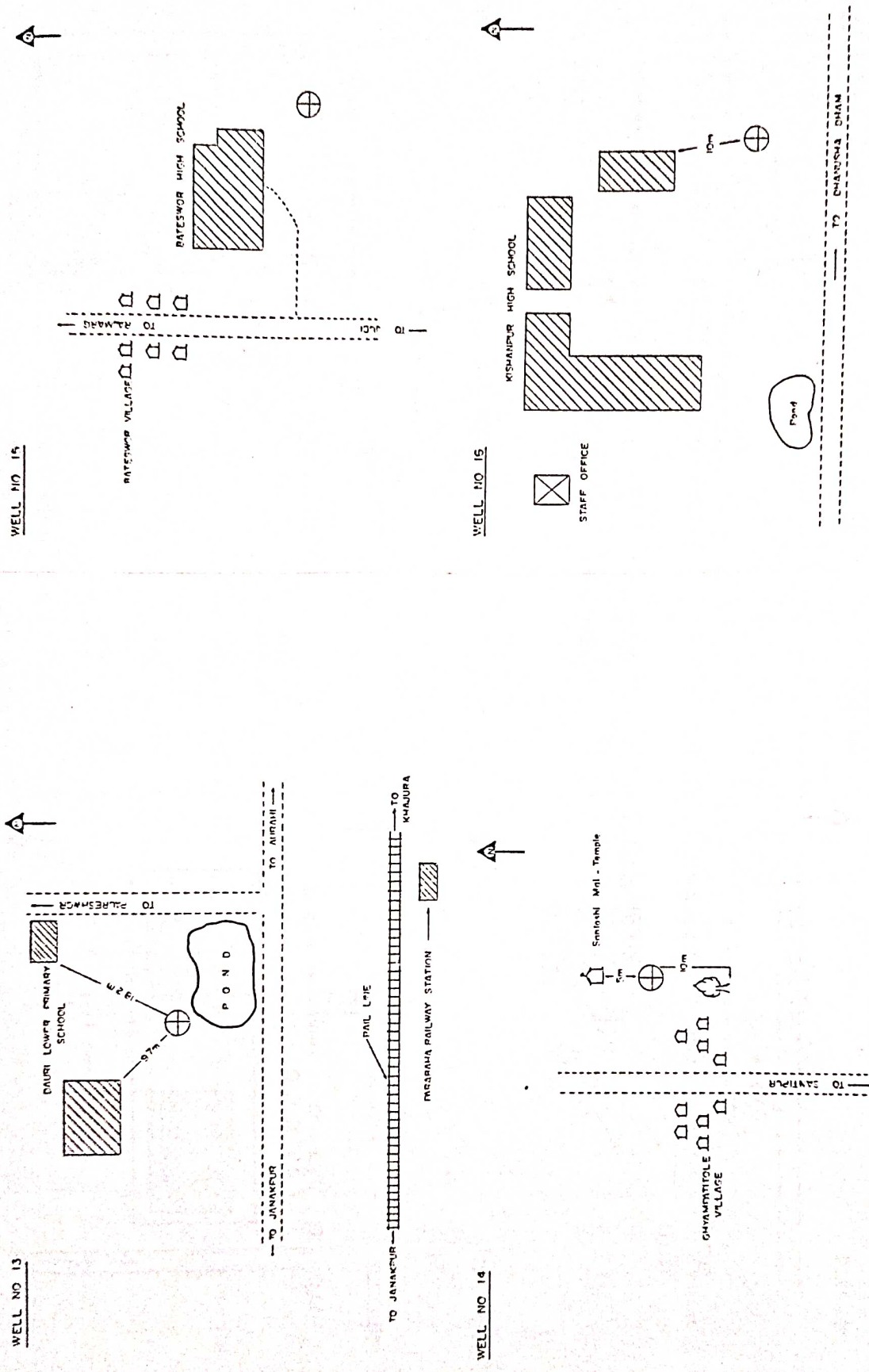


Figure 30.--Sketches of wells 13 - 16 in Dhanusha District.

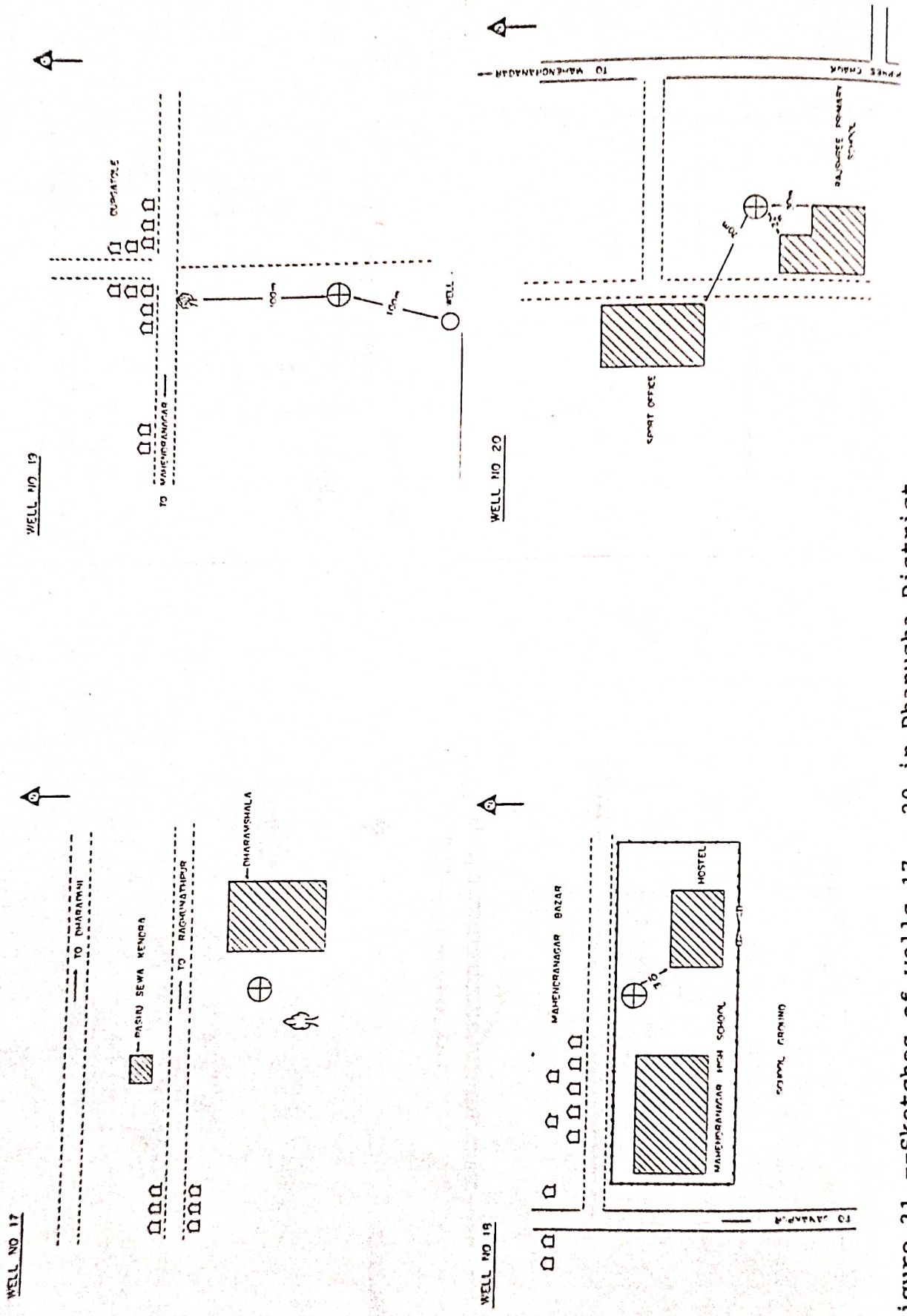


Figure 31.--Sketches of wells 17 - 20 in Dhanusha District.

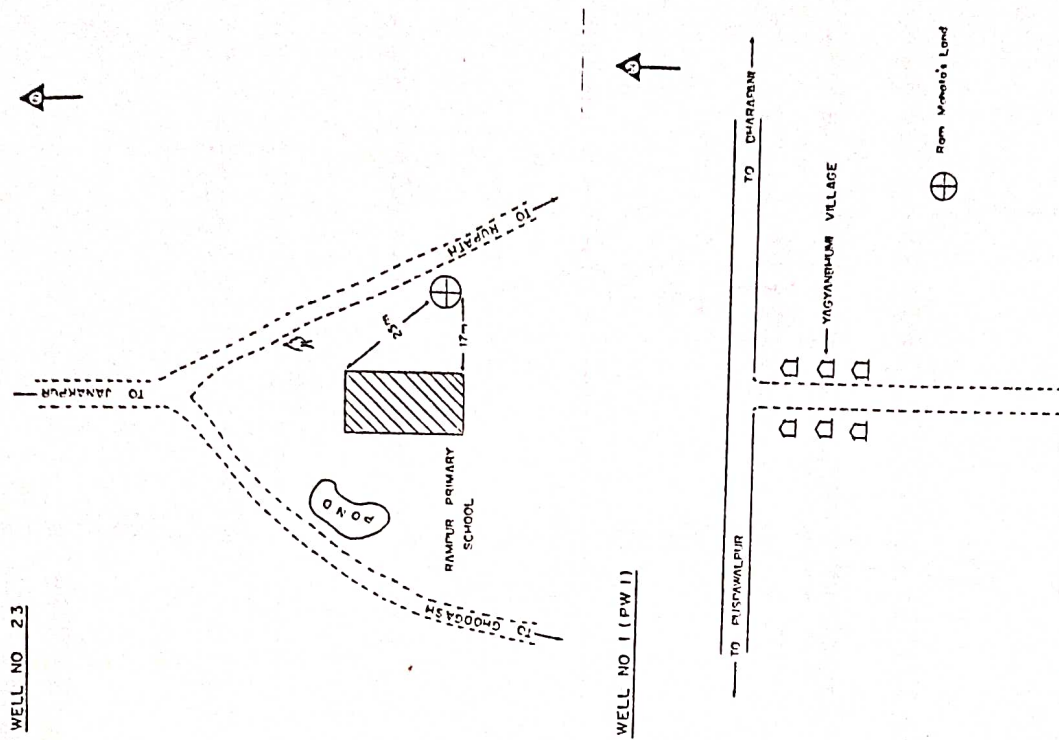


Figure 32.--Sketches of wells 21 - 23, PW 1 in Dhanusha District.

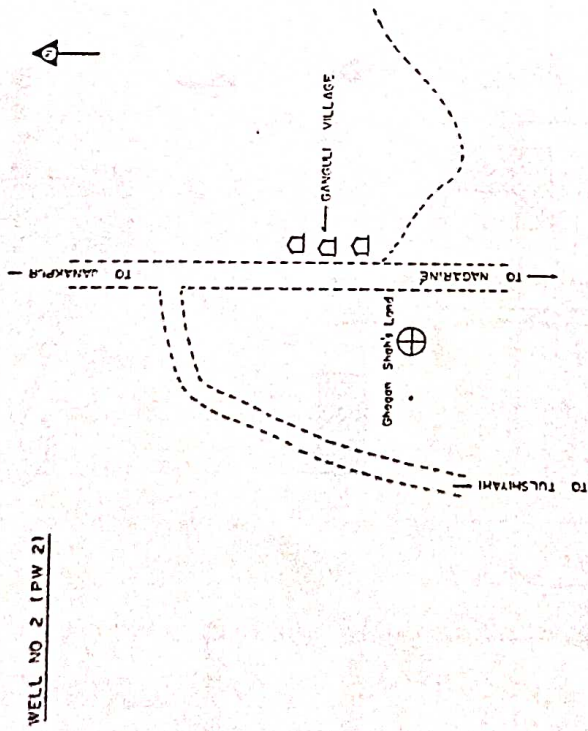
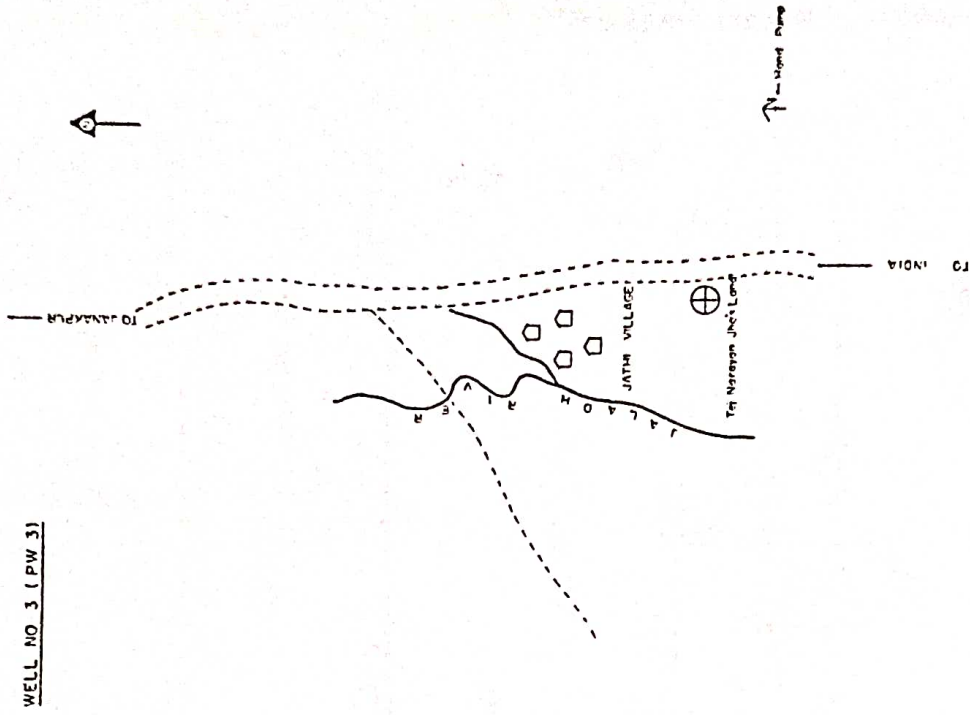


Figure 33.--Sketches of wells PW 2, 3 in Dhanusha District.

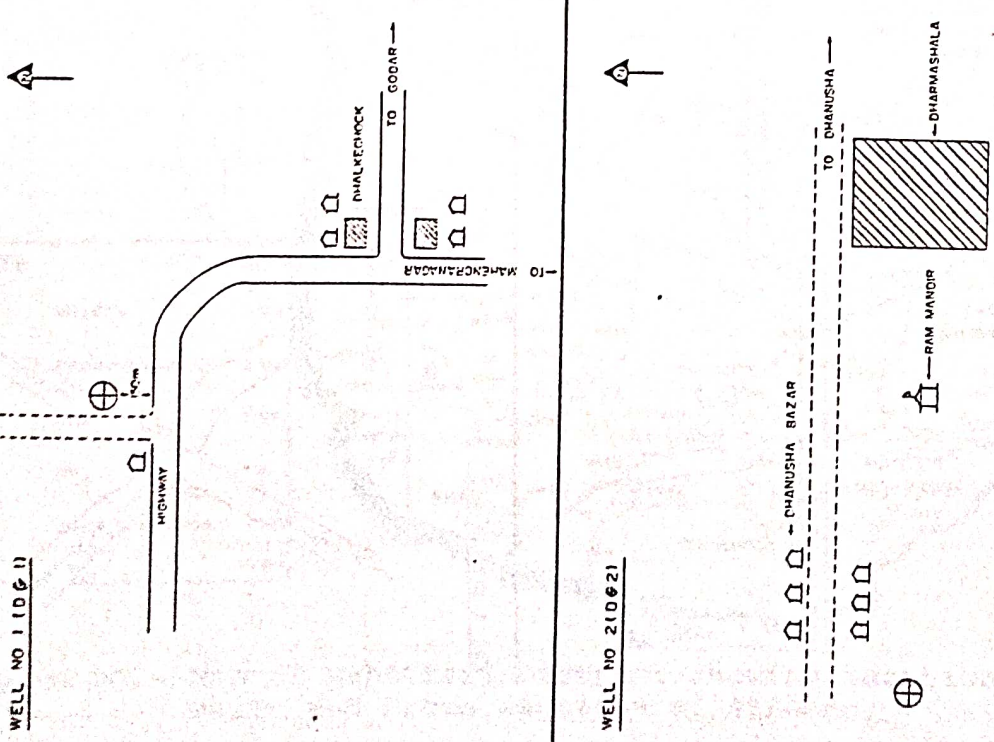
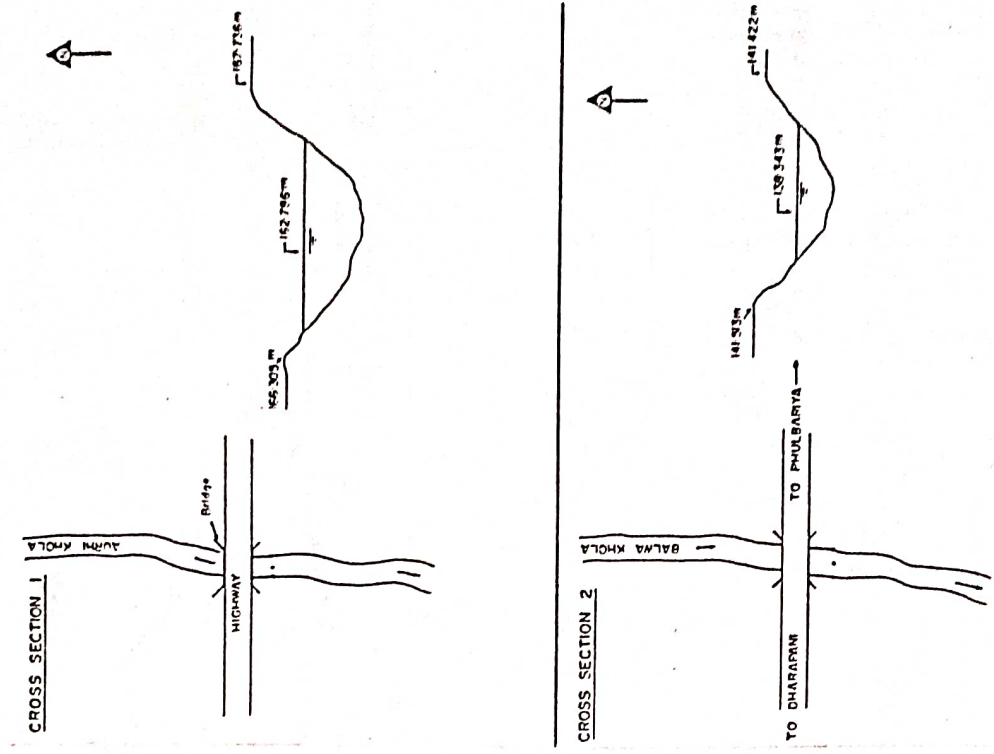


Figure 34.--Sketches of wells DG 1, 2 and sections 1, 2 in Dhanusha District.

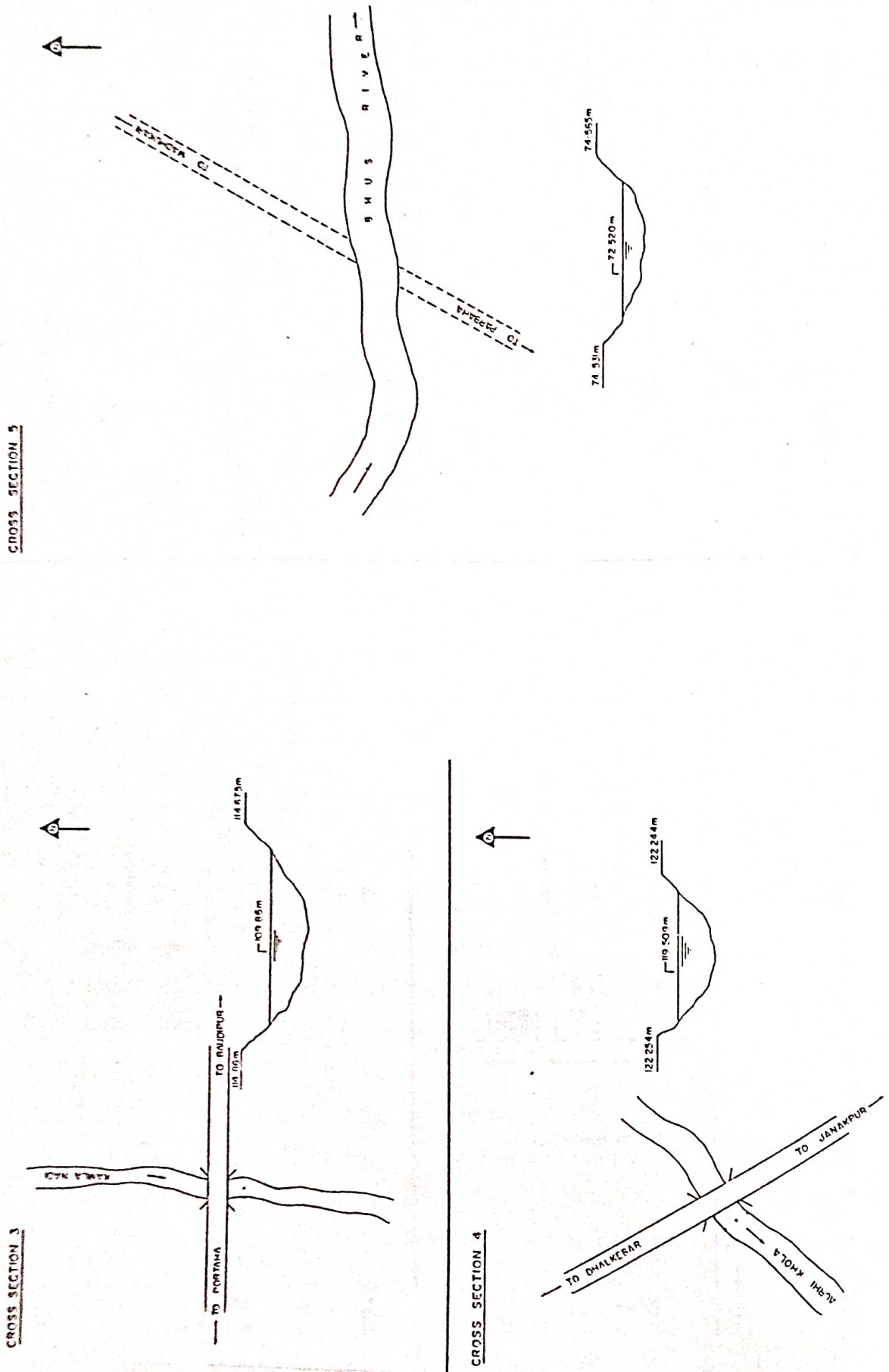


Figure 35.--Sketches of sections 3 - 5 in Dhanusha District.

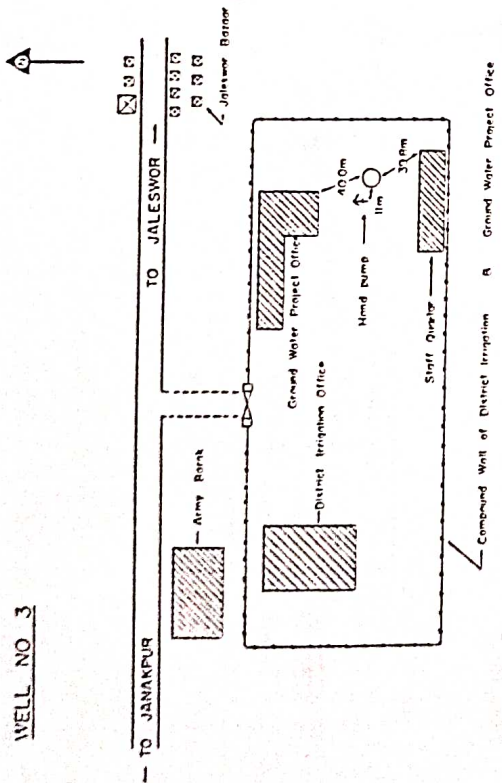
Mahottari District

Land surface altitudes at 18 wells and the water surface altitudes at 7 stream cross sections were determined in Mahottari District. There were 11 UN wells, 5 private wells, 1 dug well, 1 deep well and 5 stream cross sections surveyed. Locations are shown on the district map, Figure 36; altitudes are listed in Table 4; sketches of the wells and cross sections are shown in Figures 37 - 43.

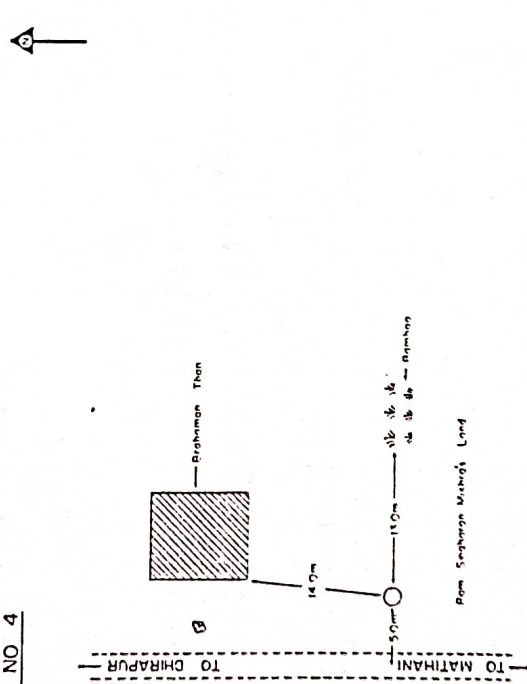
Table 4.--Well number, village or stream name, ward number, and altitude of land surface at the well or water surface in the stream in meters above sea level in Mahottari District.

<u>Well Number</u>	<u>Village or Stream Name</u>	<u>Ward Number</u>	<u>Altitude of Land or Stream Surface</u>
UN 3	Parkauli	4	63.7
UN 4	Dhirapur	3	61.6
UN 6	Harigorgama	8	72.8
UN 7	Ratauli	2	72.7
UN 8	Pokharvinda	7	77.7
UN 9	Saranchiya	9	78.9
UN 10	Madhepura	7	79.6
UN 11	Gobarhiya	5	86.4
UN 12	Kanchanpur	7	88.9
UN 14	Sundarpur	6	100.6
UN 15	Nigaul	4	108.4
PW 6	Halkhori	2	63.6
PW 11	Dhamaura	4	82.3
PW 14	Sonama	5	92.9
PW 20	Banauli	6	67.8
PW 22	Bijalpura	1	114.8
DG 3	Kalbara	12	60.4
DW 4	Beigachhi	8	152.4
CS 1	Maraha Khola		184.0
CS 2	Jungha Khola		206.5
CS 3	Rato River		218.1
CS 4	Maraha Khola		92.2
CS 5	Rato River		83.6
CS 6	Jungha Khola		75.9
CS 7	Katumashri Khola		69.5

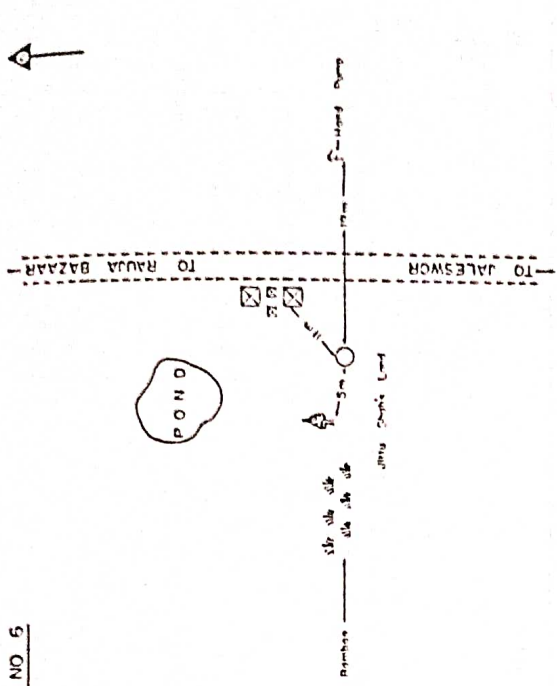
WELL NO 3



WELL NO 4



WELL NO 5



WELL NO 7

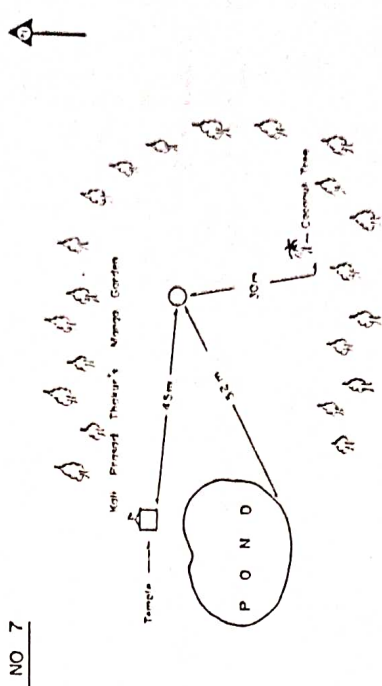


Figure 37.--Sketches of wells 3, 4, 6, 7 in Mahottari District.

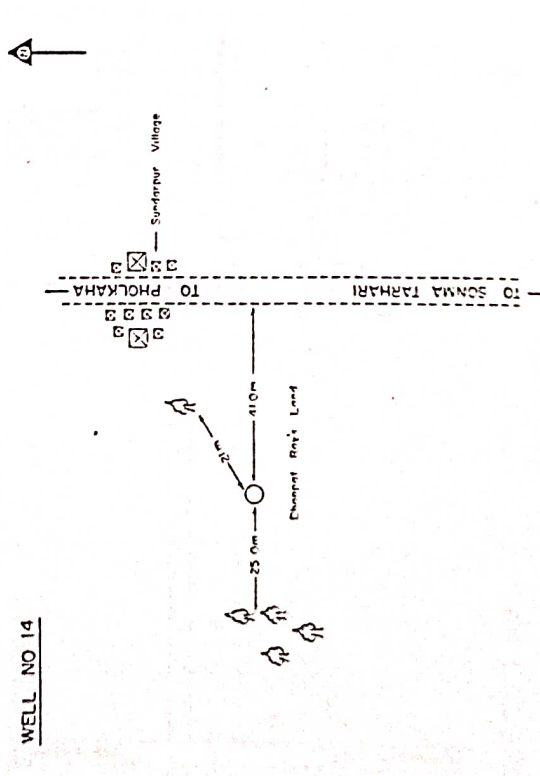
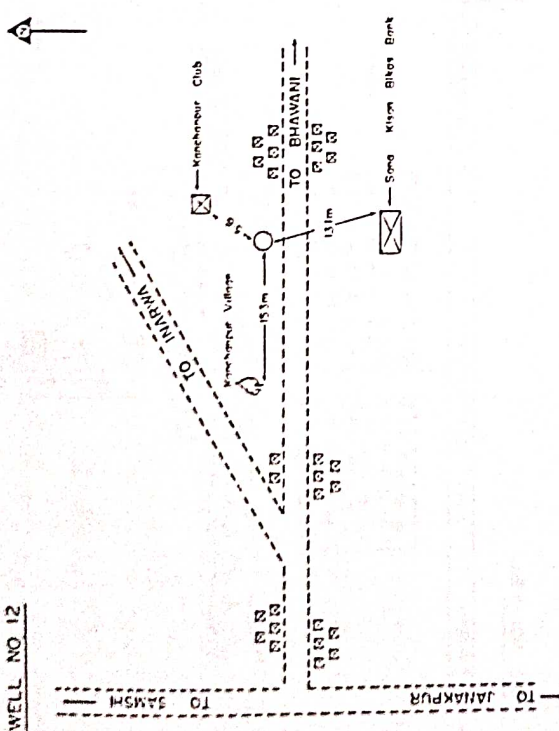
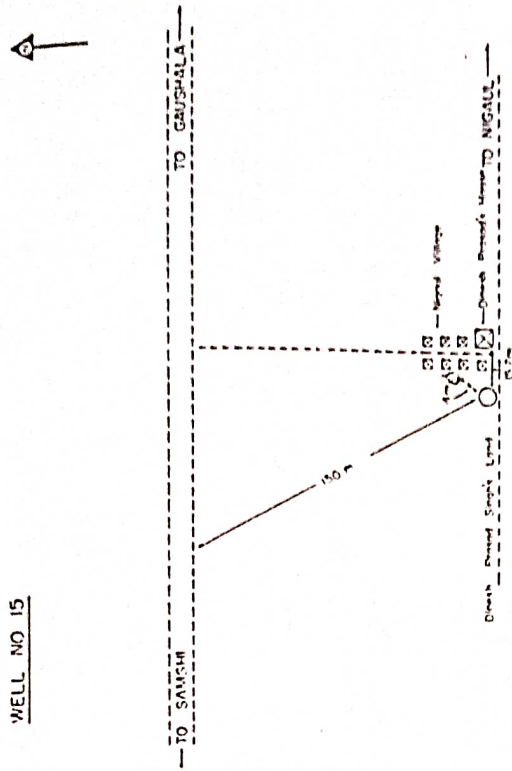
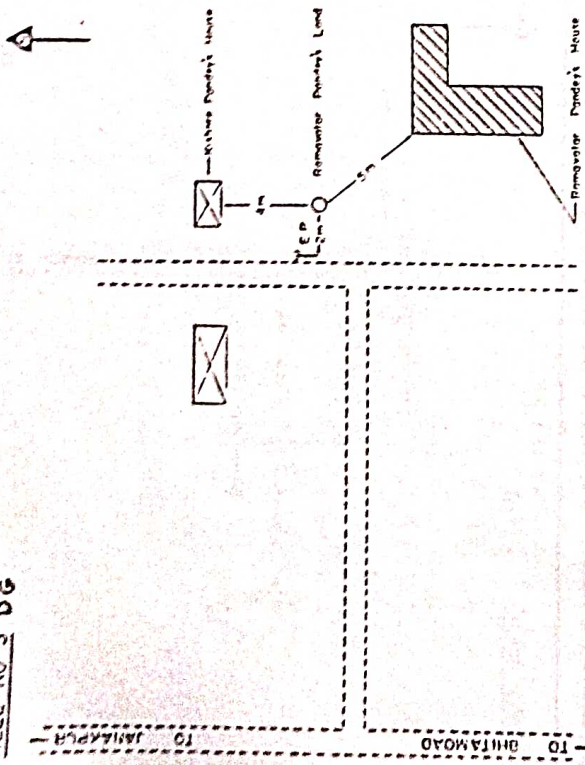
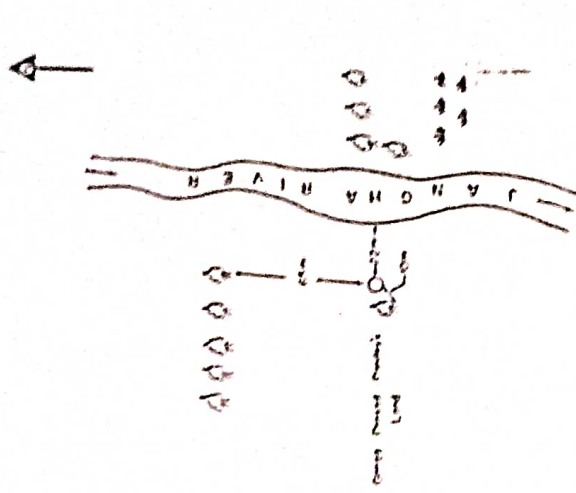


Figure 39.--Sketches of wells 12, 14, 15 in Mahottari District.

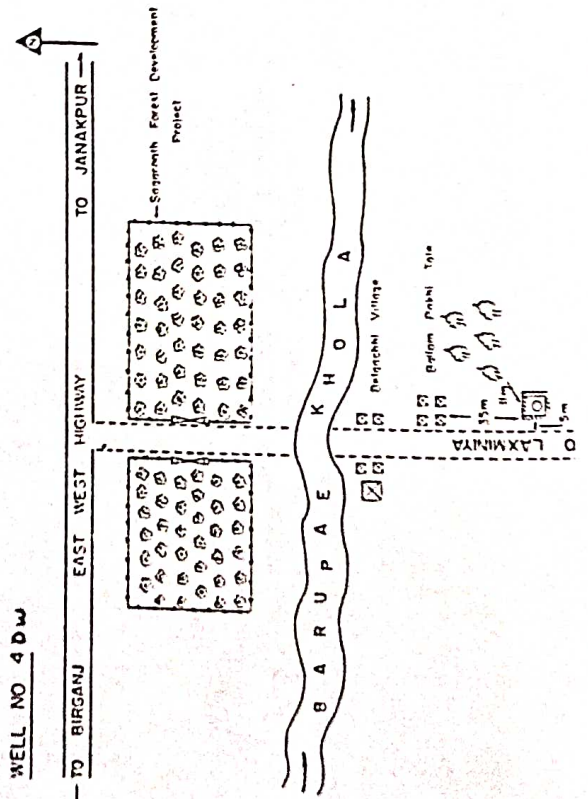
WELL NO 3 DG



WELL NO 6 PW



WELL NO 4 DW



WELL NO 11 PW

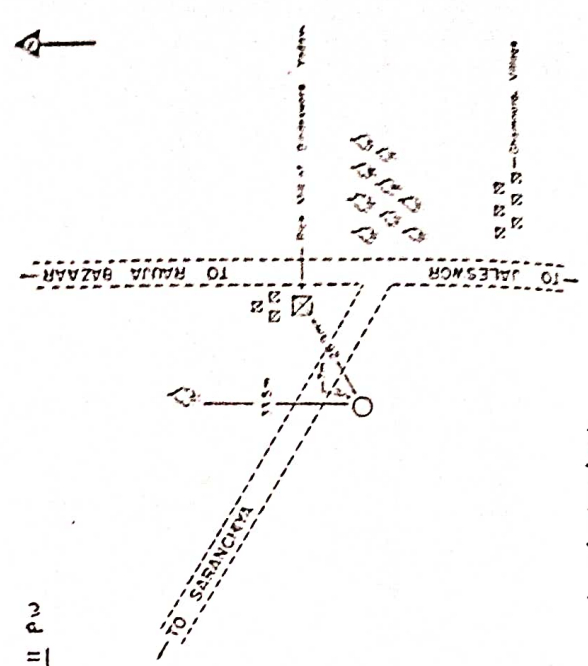
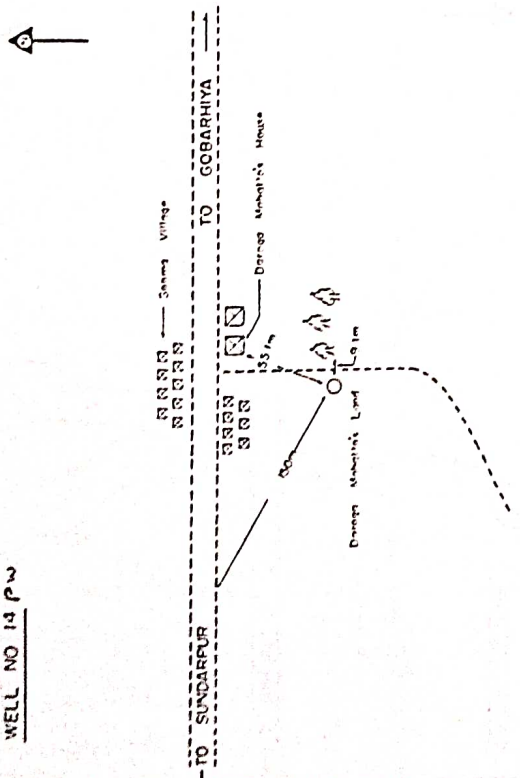
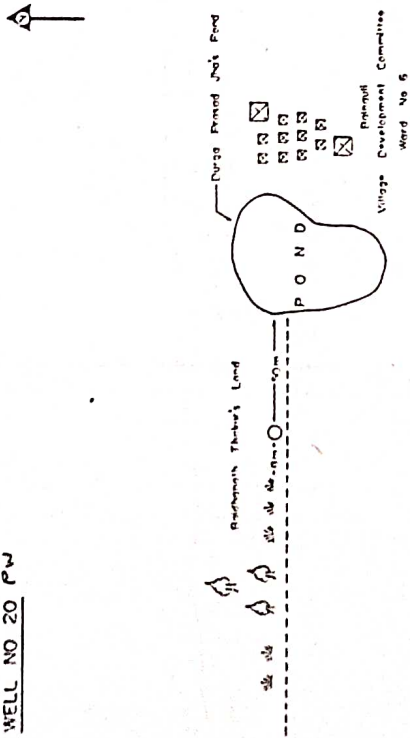


Figure 40.--Sketches of wells DG 3, DW 4, PW 6, 11 in Mahottari District.

WELL NO 14 PW



WELL NO 20 PW



WELL NO 22 PW

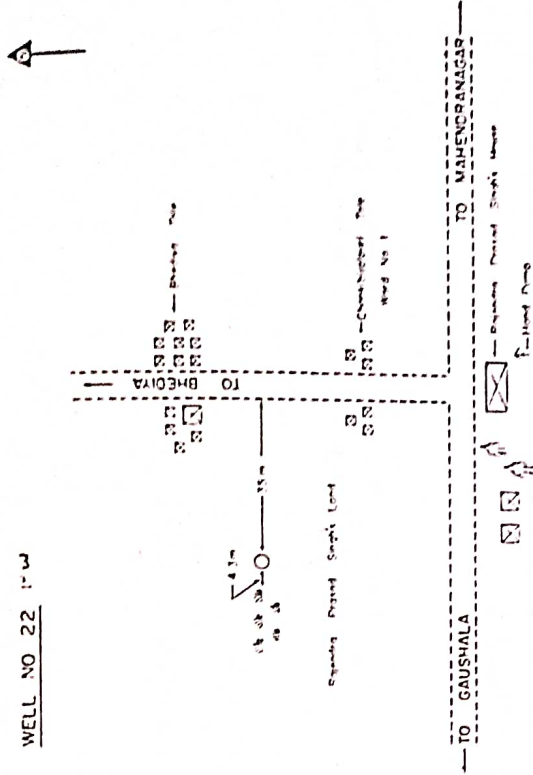


Figure 41.--Sketches of wells PW 14, 20, 22 in Mahottari District.

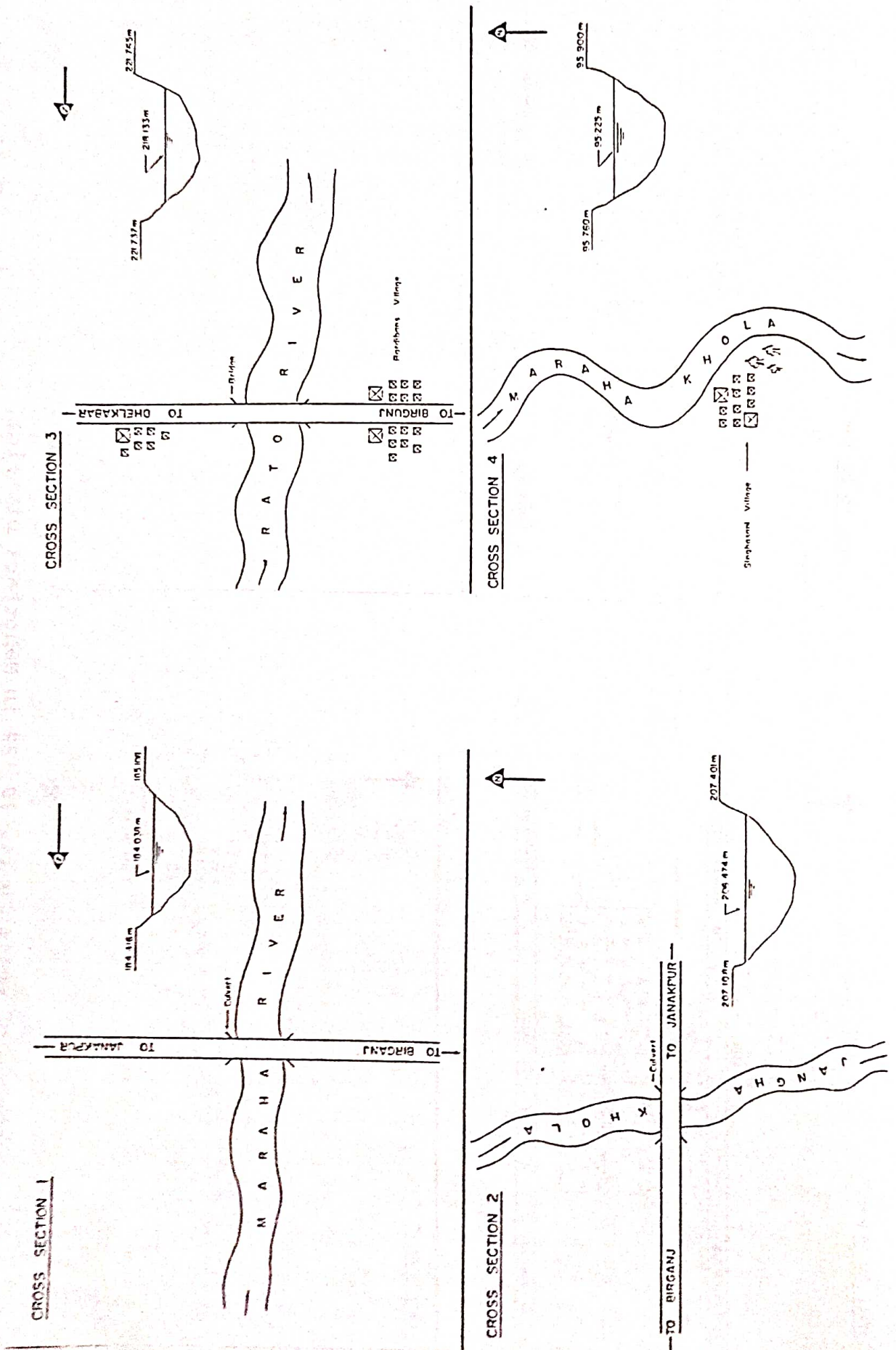


Figure 42.--Sketches of sections 1 - 4 in Mahottari District.

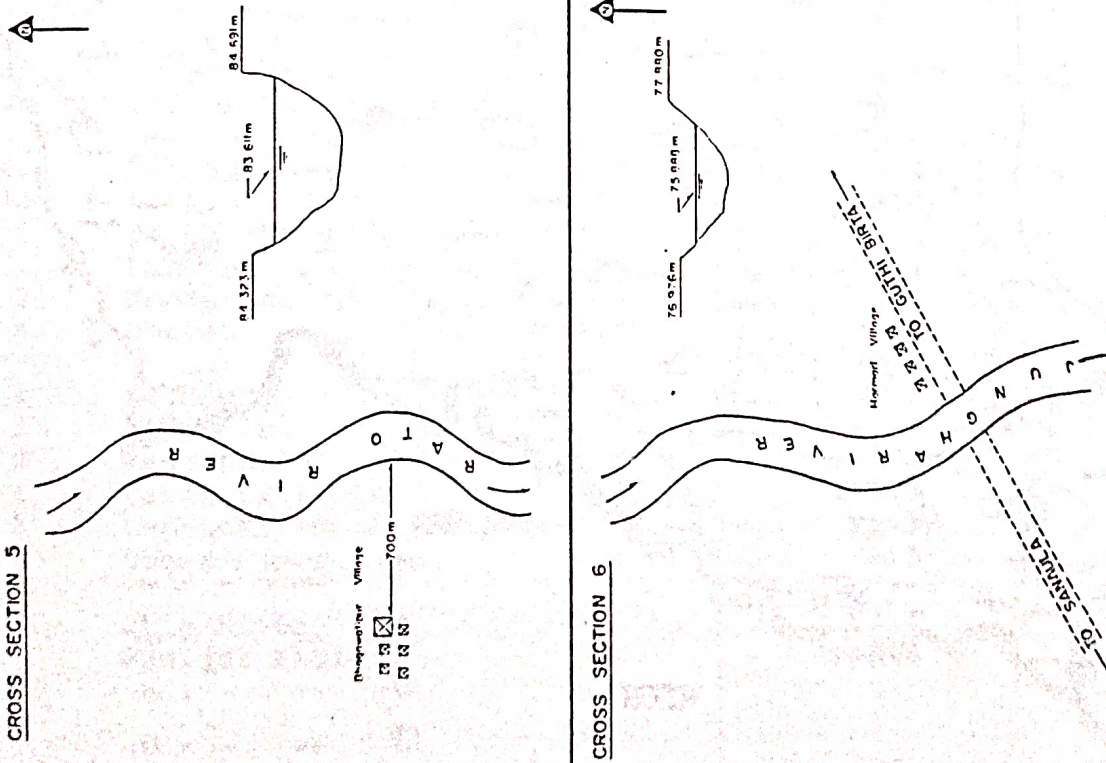
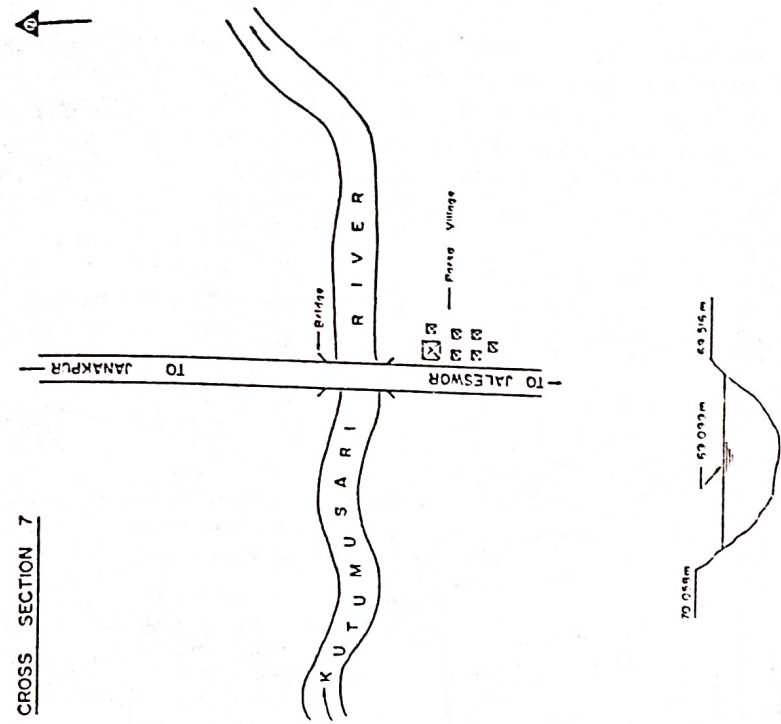
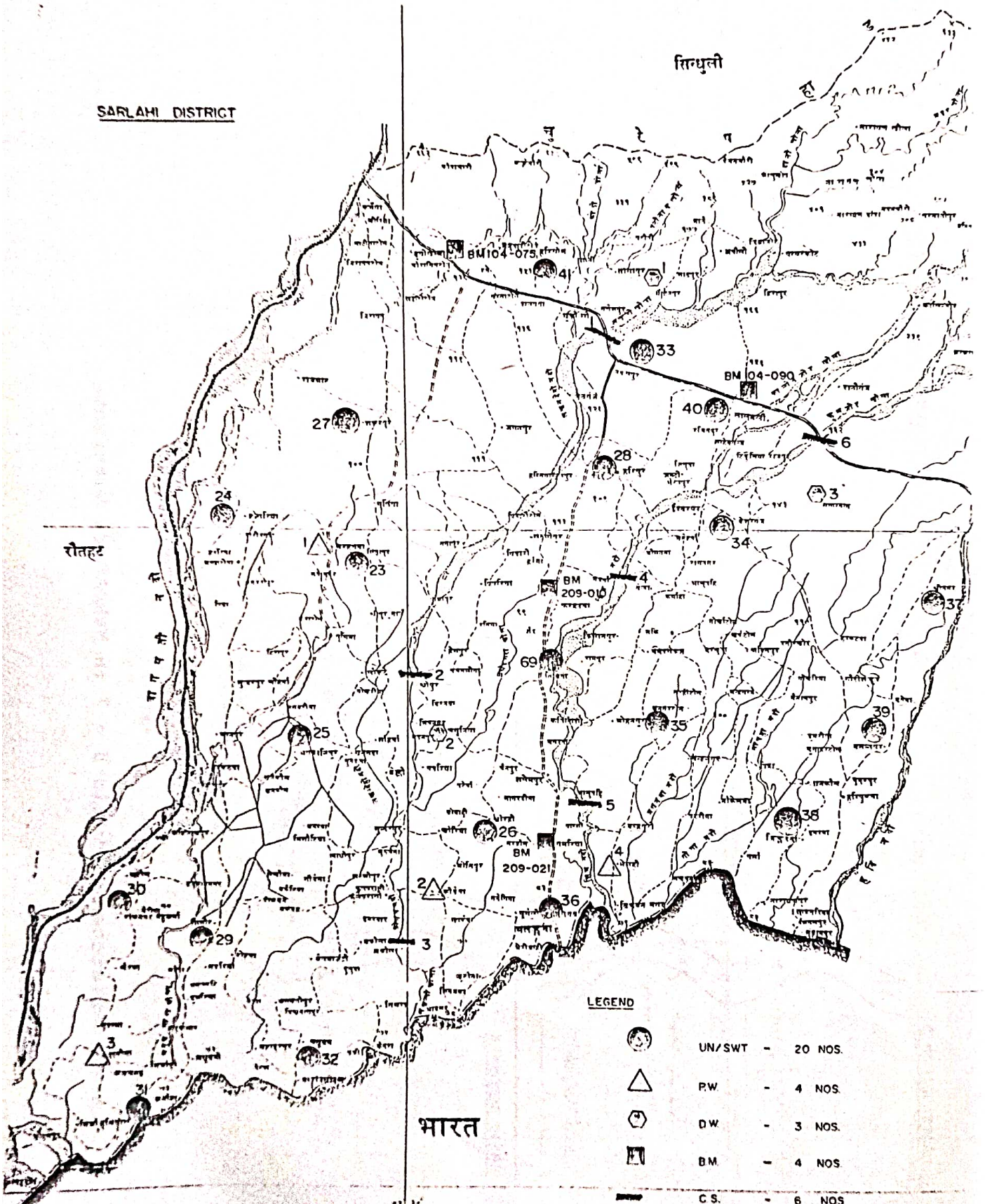


Figure 43.--Sketches of wells 5 - 7 in Mahottari District.

Appendix V



LEGEND

	UN/SWT - 20 NOS.
	PW - 4 NOS.
	DW - 3 NOS.
	BM - 4 NOS.
	C.S. - 6 NOS.

Figure 44.--Map of Sarlahi District showing locations of wells and cross sections of streams.

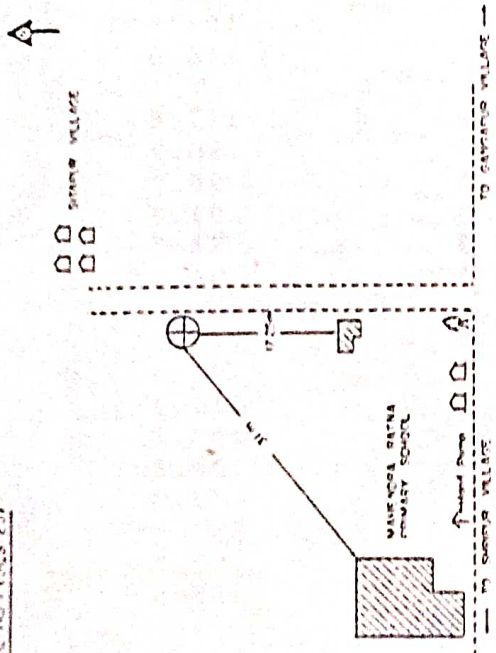
Sarlahi District

Land surface altitudes at 27 wells and the water surface altitudes at 6 stream cross sections were determined in Sarlahi District. There were 20 UN wells, 4 private wells, 3 dug wells and 6 stream cross sections surveyed. Locations are shown on the district map, Figure 44; altitudes are listed in Table 5; sketches of the wells and cross sections are shown in Figures 45 - 53.

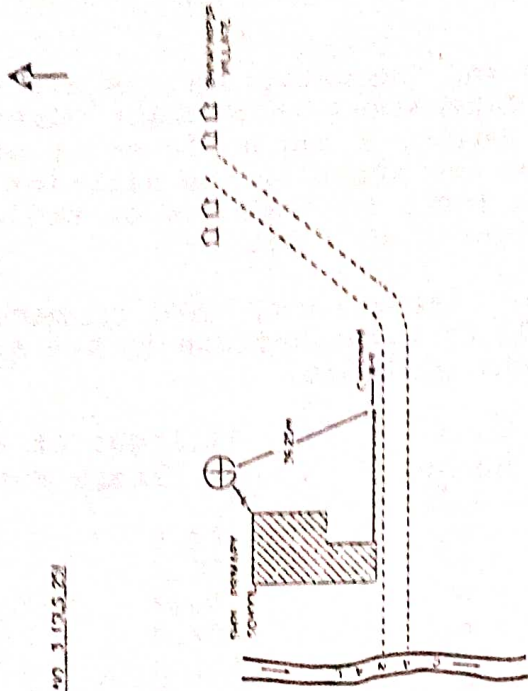
Table 5.--Well number, village or stream name, ward number, and altitude of land surface at the well or water surface in the stream in meters above sea level in Sarlahi District.

<u>Well Number</u>	<u>Village or Stream Name</u>	<u>Ward Number</u>	<u>Altitude of Land or Stream Surface</u>
UN 23	Murtiya, Sitapur	6	97.0
UN 24	Harzaria	8	99.2
UN 25	Bhagwanpur	8	86.7
UN 26	Aurahi	4	87.9
UN 27	Shankarpur	4	101.2
UN 28	Haripur	9	114.5
UN 29	Sisaut	8	77.1
UN 30	Chhataul (Bairiy)	5	77.8
UN 31	Balra	5	72.7
UN 32	Madhuban Goth	1	75.3
UN 33	Jingarwa	9	139.1
UN 34	Kesharganj		134.6
UN 35	Mohanpur	2	96.0
UN 36	Malangwa Nagarpalika	4	83.1
UN 37	Sri Nagar	4	132.6
UN 38	Jingarwa		90.3
UN 39	Basantpur		104.8
UN 40	Lalbandi		148.8
UN 41	Hariaun	2	147.6
UN 42	Sirsiya	9	96.7
PW 1	Barahathawa	8	98.7
PW 2	Kandene	3	81.5
PW 3	Chhautana	3	74.3
PW 4	Bhelahi	3	84.1
Dg 1	Sasapur	5	159.8
DG 2	Nawalpur	9	91.5
DG 3	Kesharganj	3	135.3
CS 1	Lakhanti Khola		135.8
CS 2	Lakhanti Khola (Sripur)		90.3
CS 3	Sogan River		79.0
CS 4	Jhia River		83.5
CS 5	Phuljor Khola		158.6

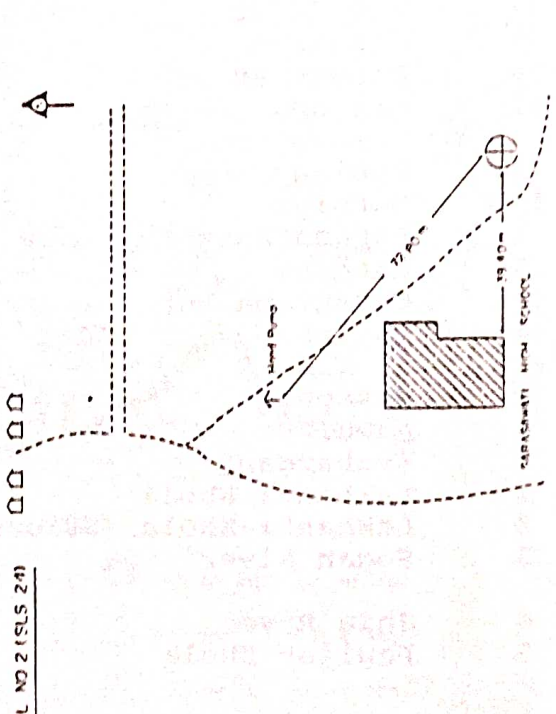
WELL NO 1 (SLS 23)



WELL NO 3 (SLS 22)



WELL NO 2 (SLS 24)



WELL NO 4 (SLS 25)

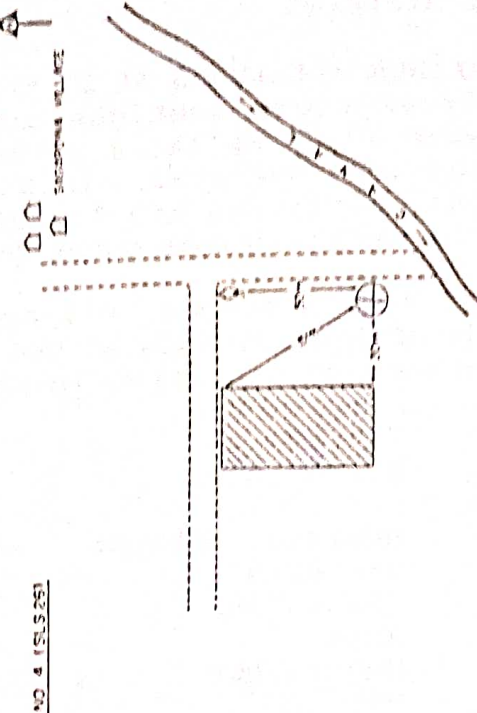


Figure 45.--Sketches of wells 23 - 26 in Sarlahi District.

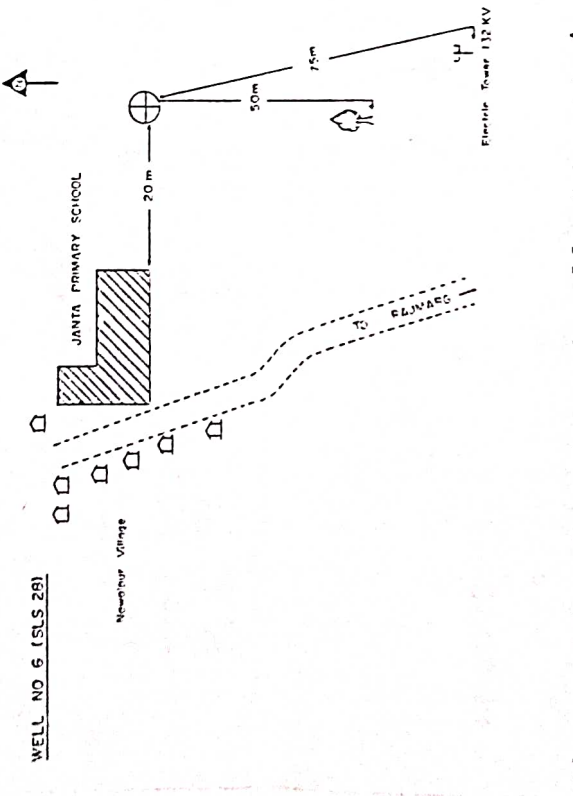
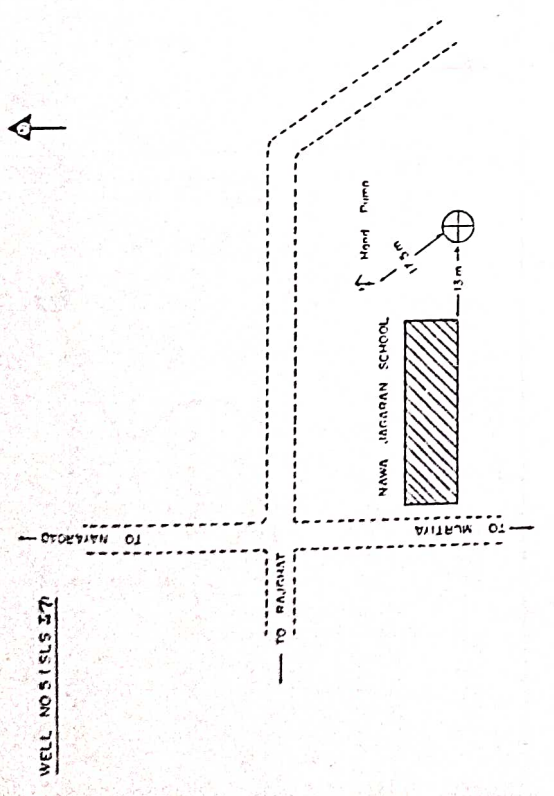
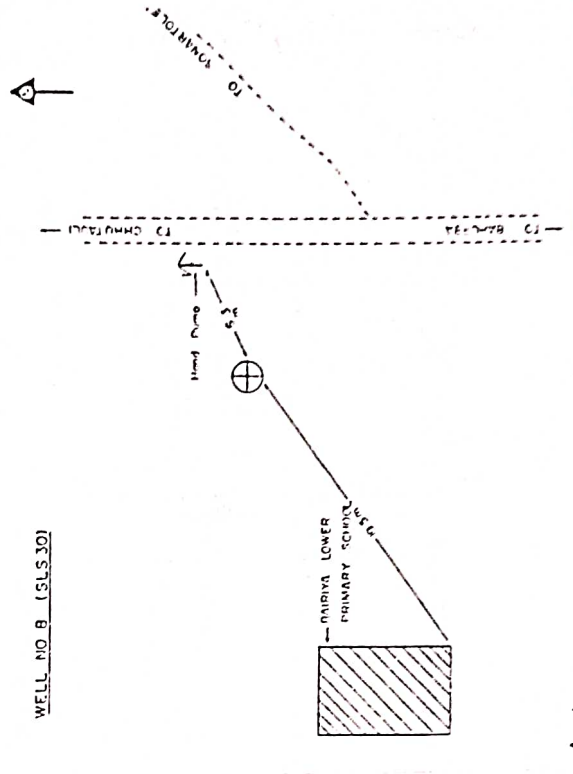
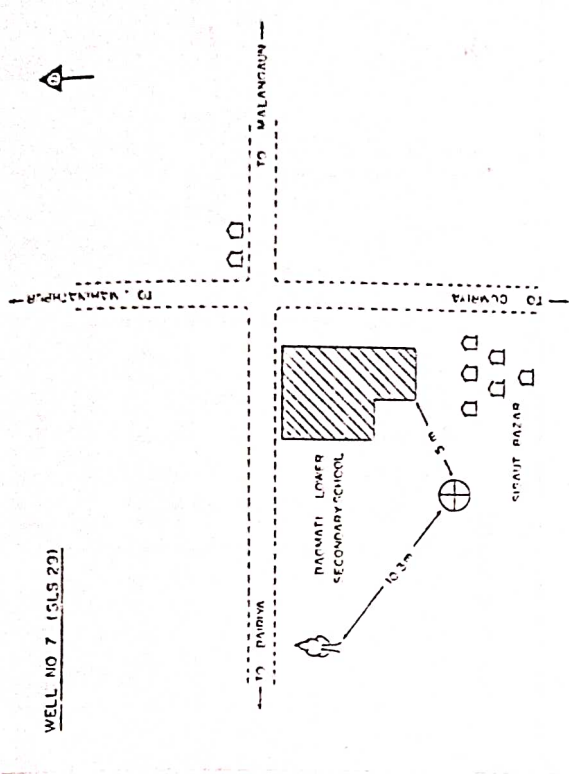


Figure 46.--Sketches of wells 27 - 30 in Sarlahi District.

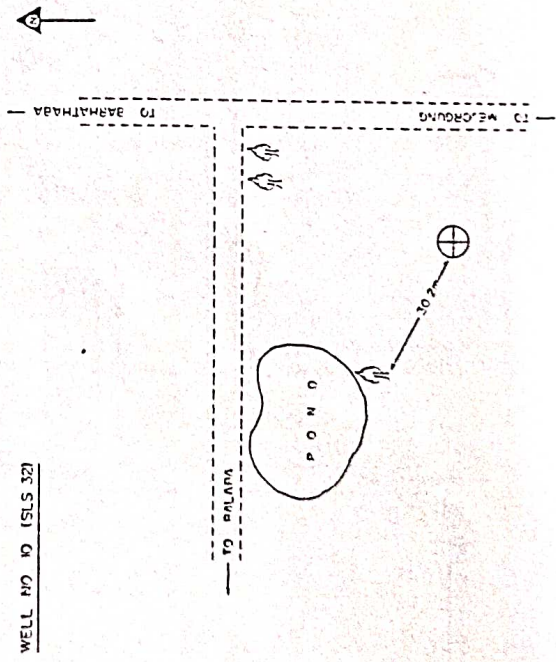
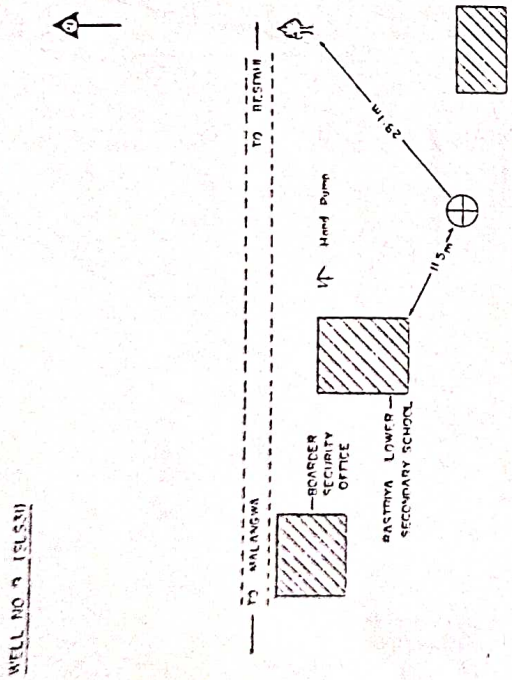
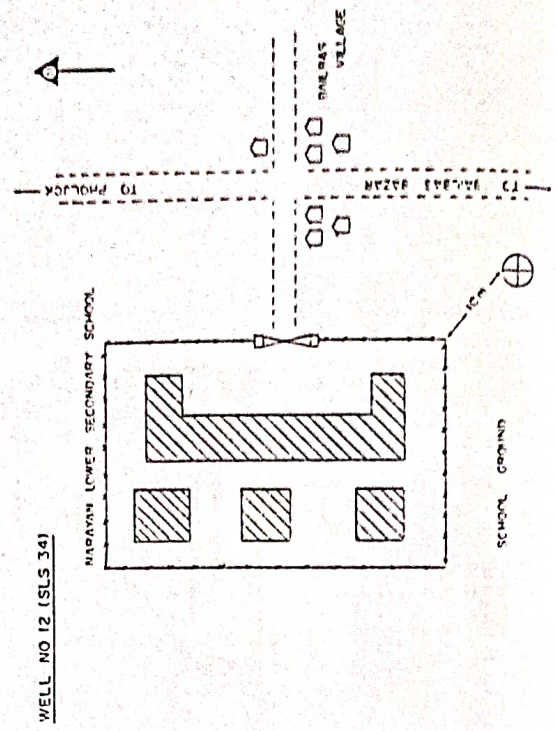
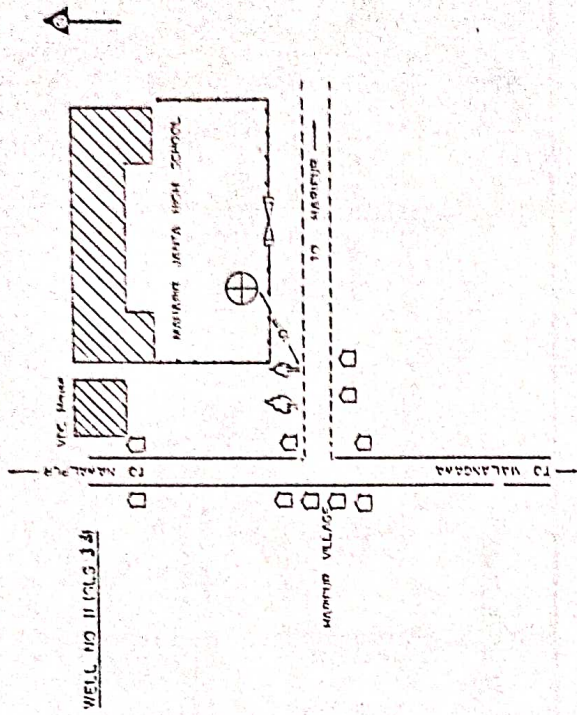


Figure 47.--Sketches of wells 31 - 34 in Sarlahi District.

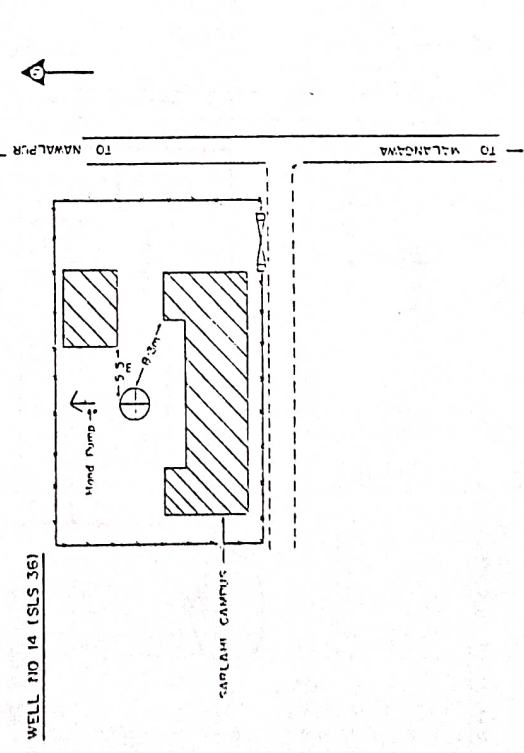
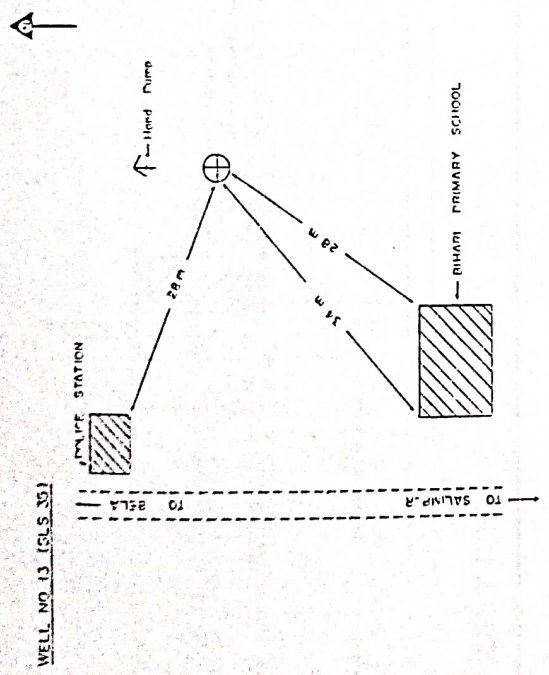
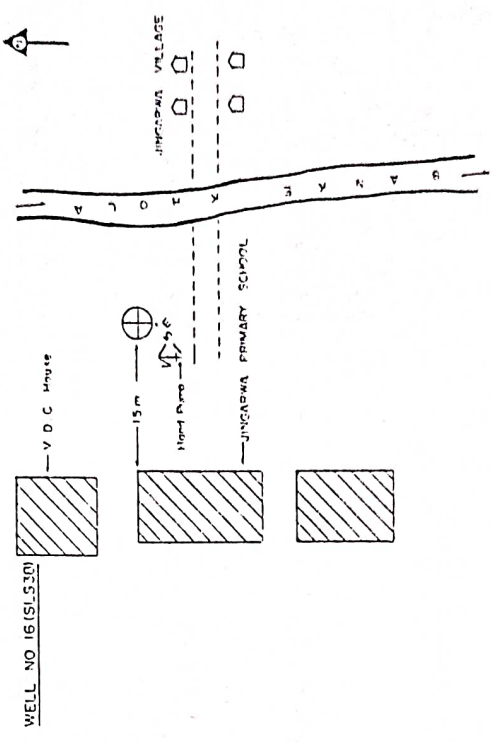
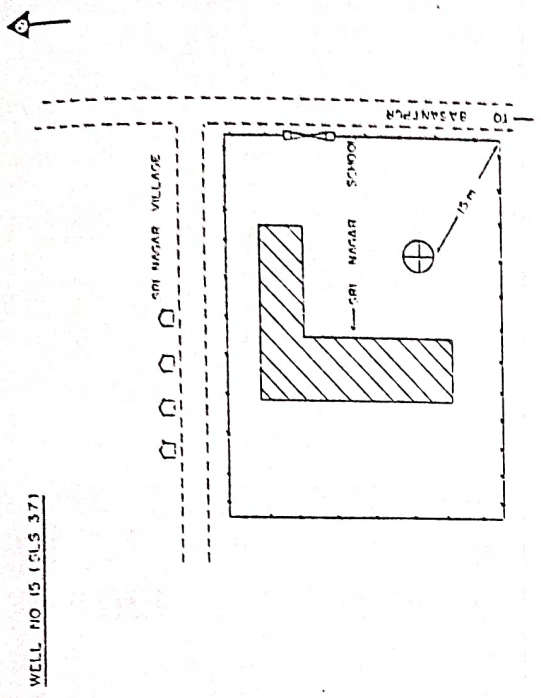
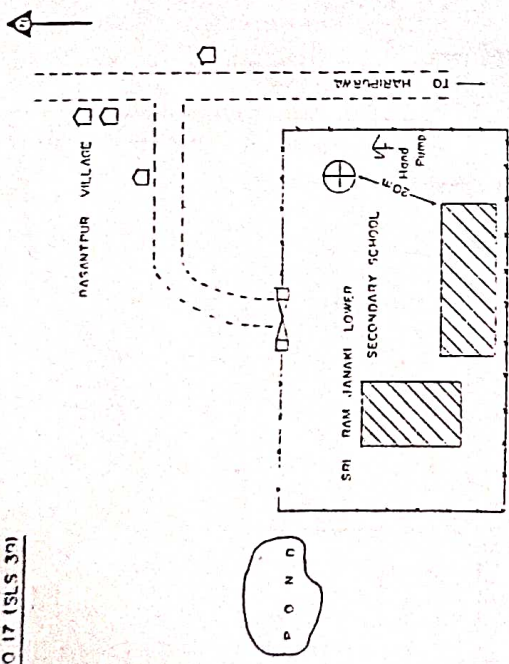
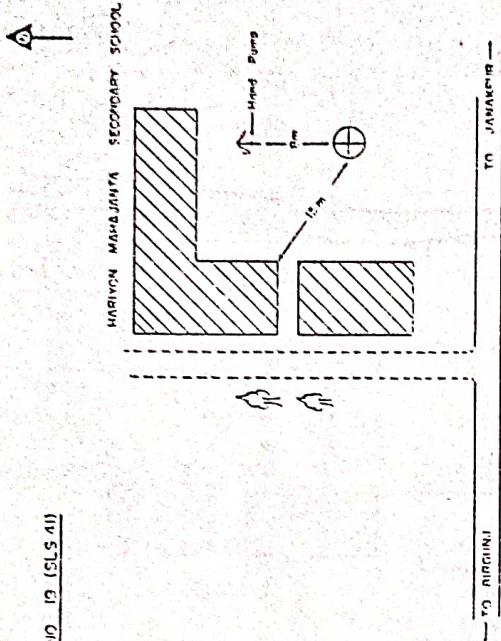


Figure 48.--Sketches of wells 35 - 38 in Sarlahi District.

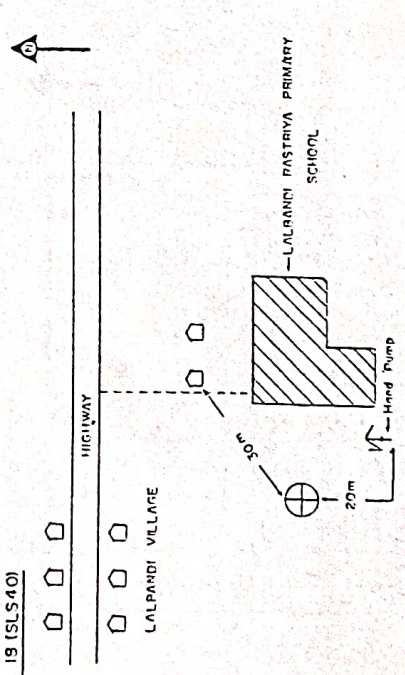
WELL NO 17 (SLS 37)



WELL NO 19 (SLS 41)



WELL NO 19 (SLS 40)



WELL NO 20 (SLS 59)

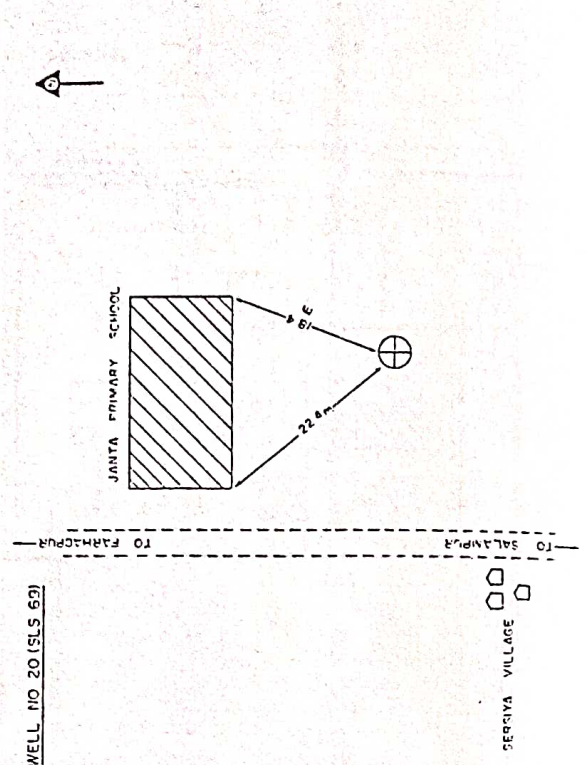


Figure 49.--Sketches of wells 39 - 41, 69 in Sarlahi District.

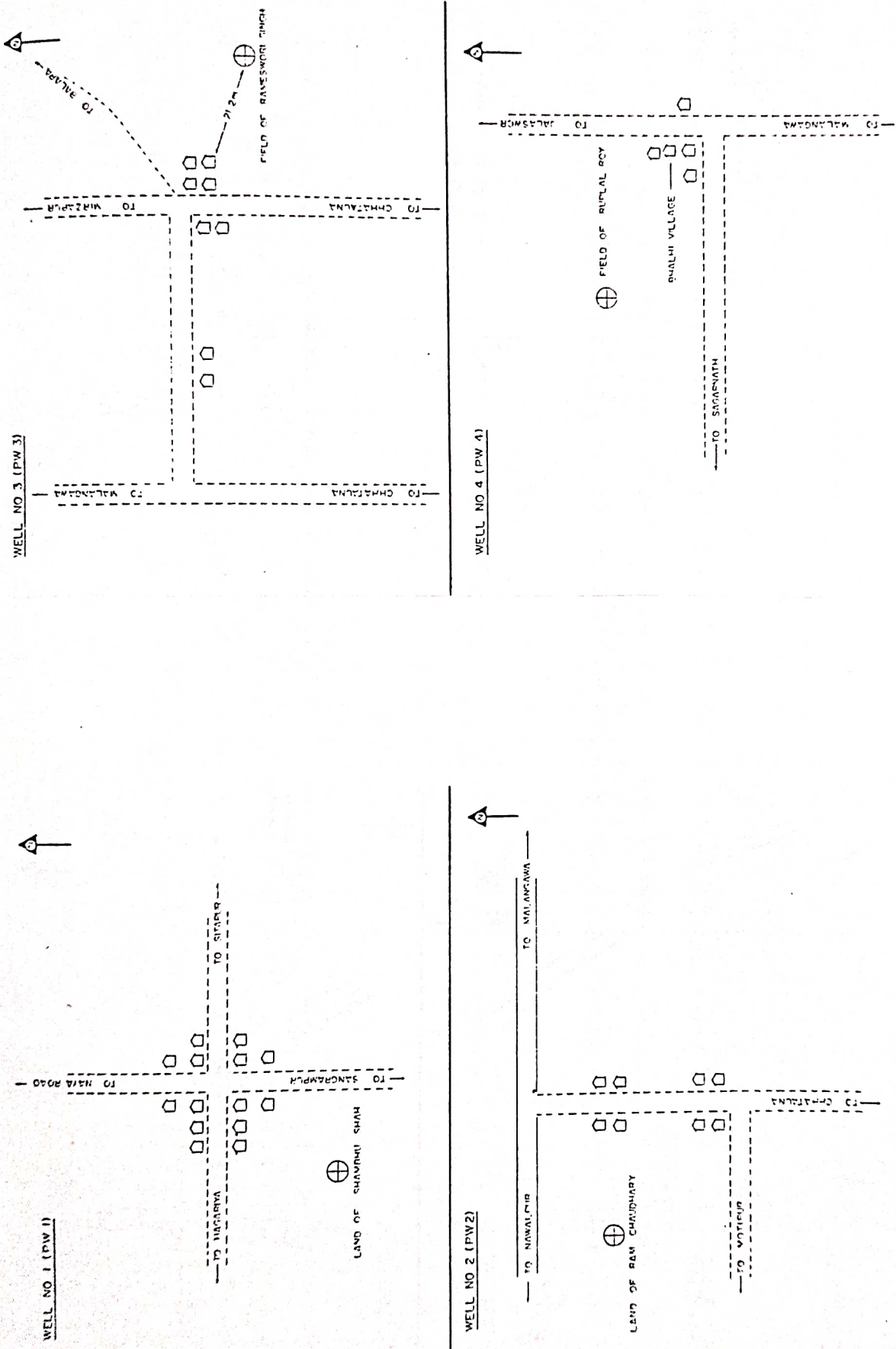


Figure 50.---Sketches of wells PW 1 - 4 in Sarlahi District.

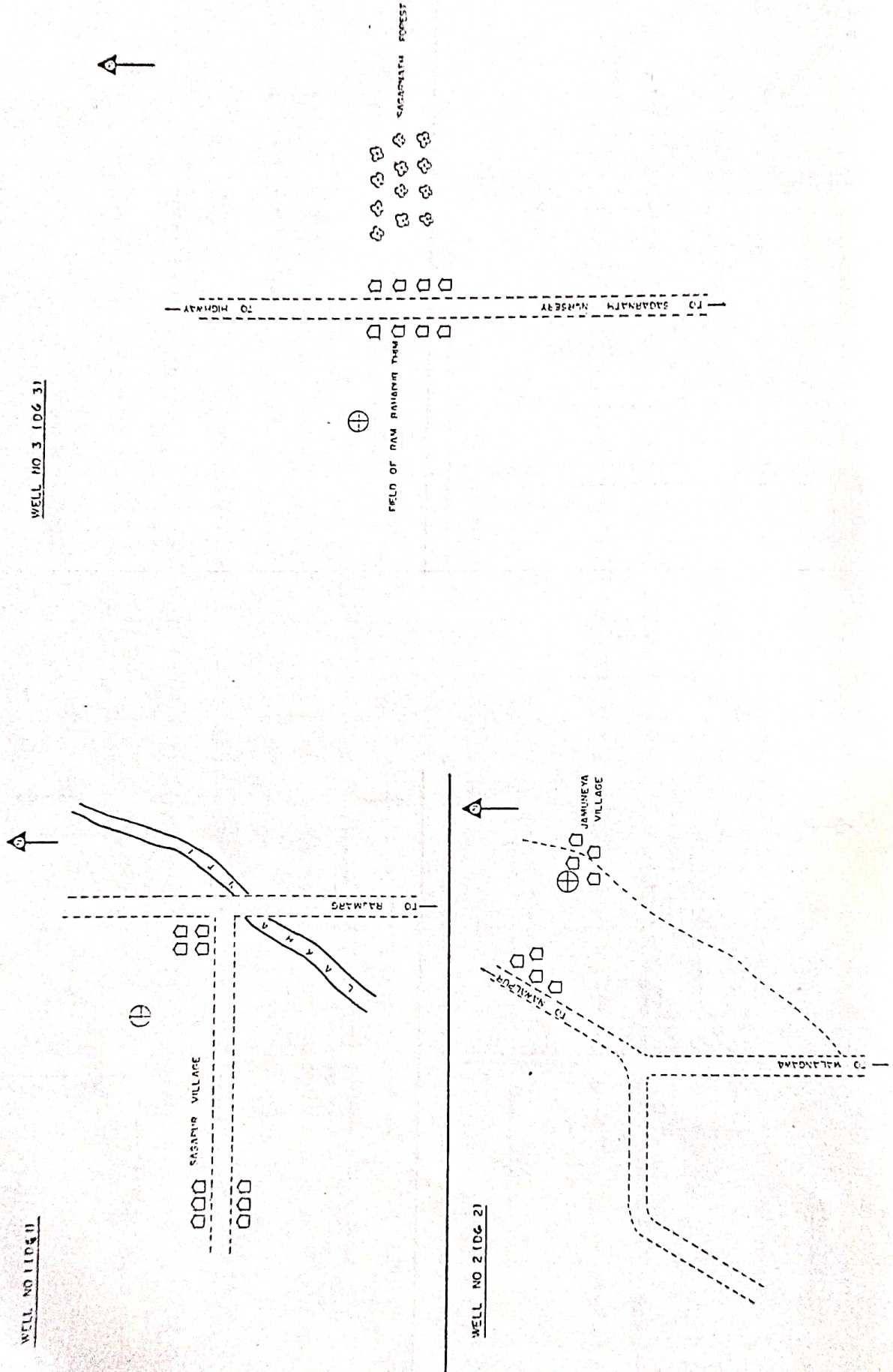


Figure 51.--Sketches of wells DG 1 - 3 in Sarlahi District.

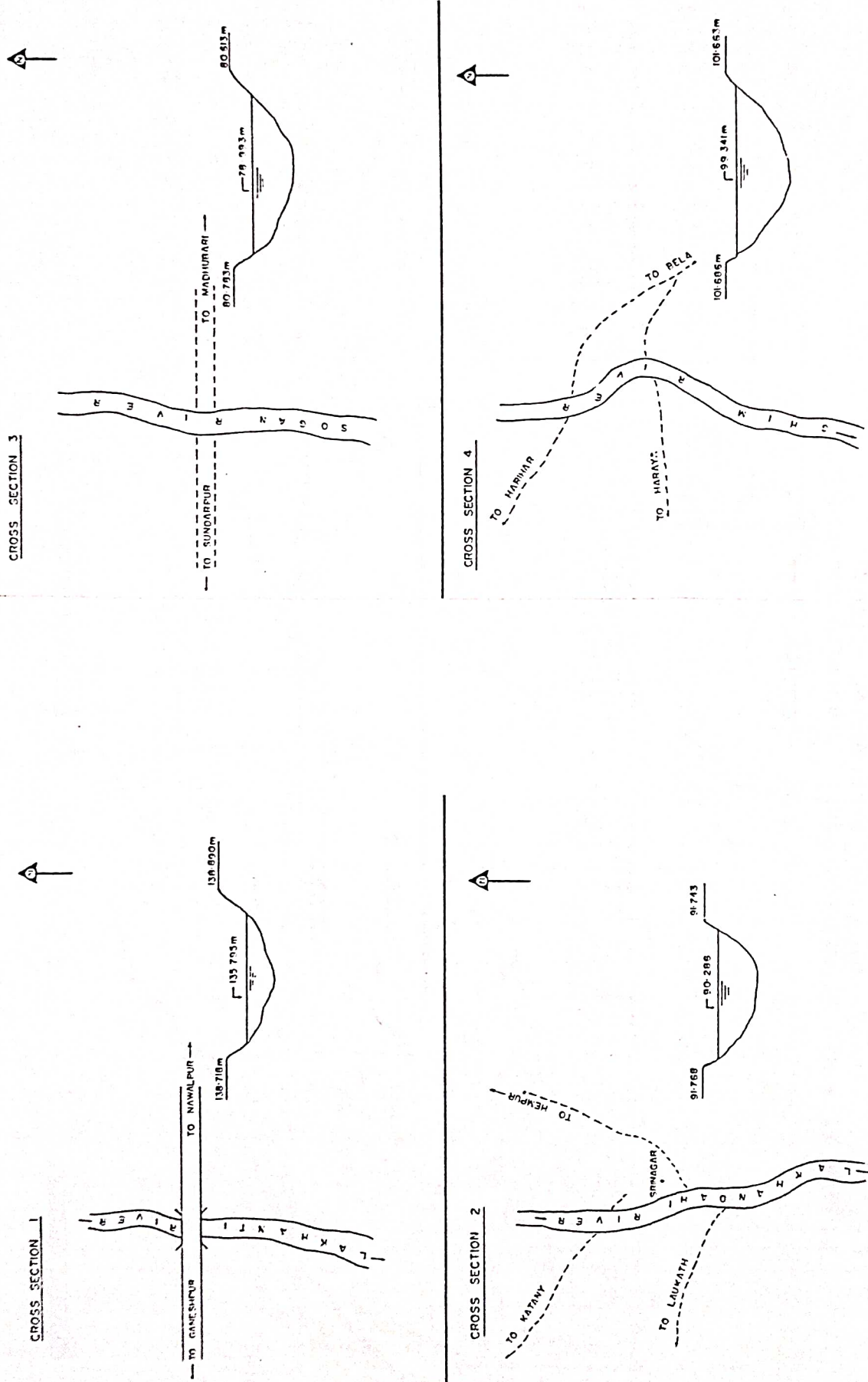


Figure 52.--Sketches of sections 1 - 4 in Sarlahi District.

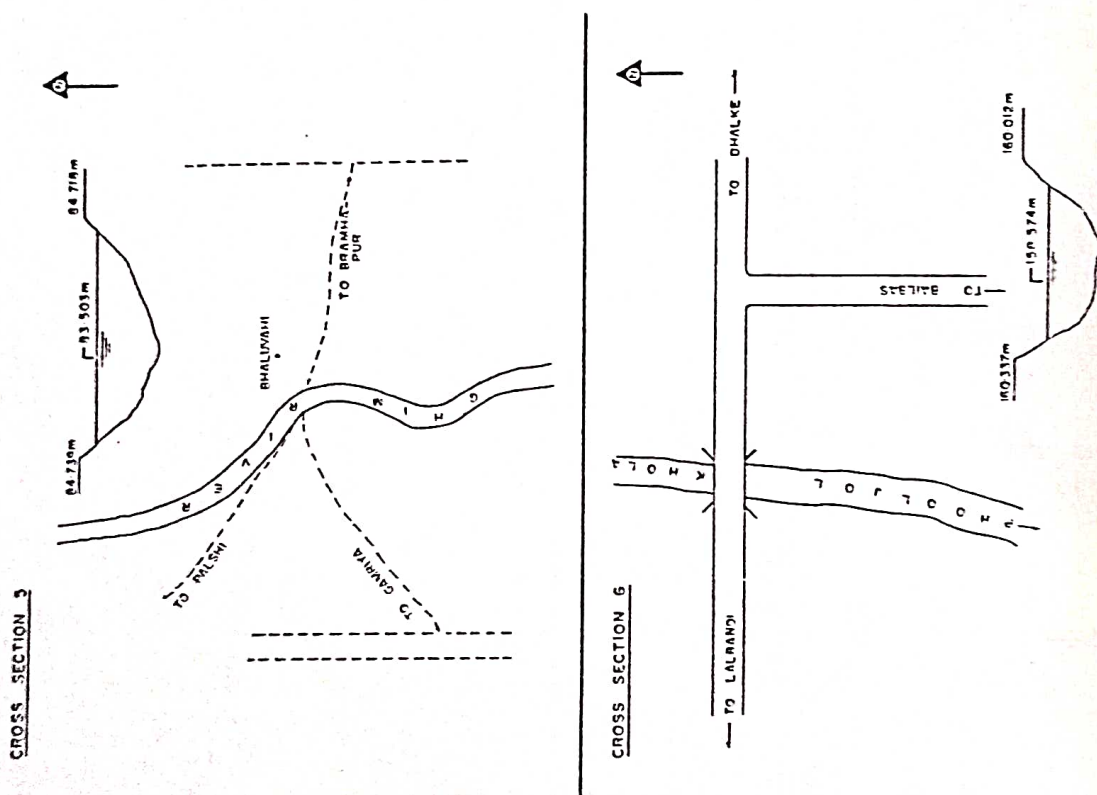


Figure 53.--Sketches of sections 5 - 6 in Sarlahi District.

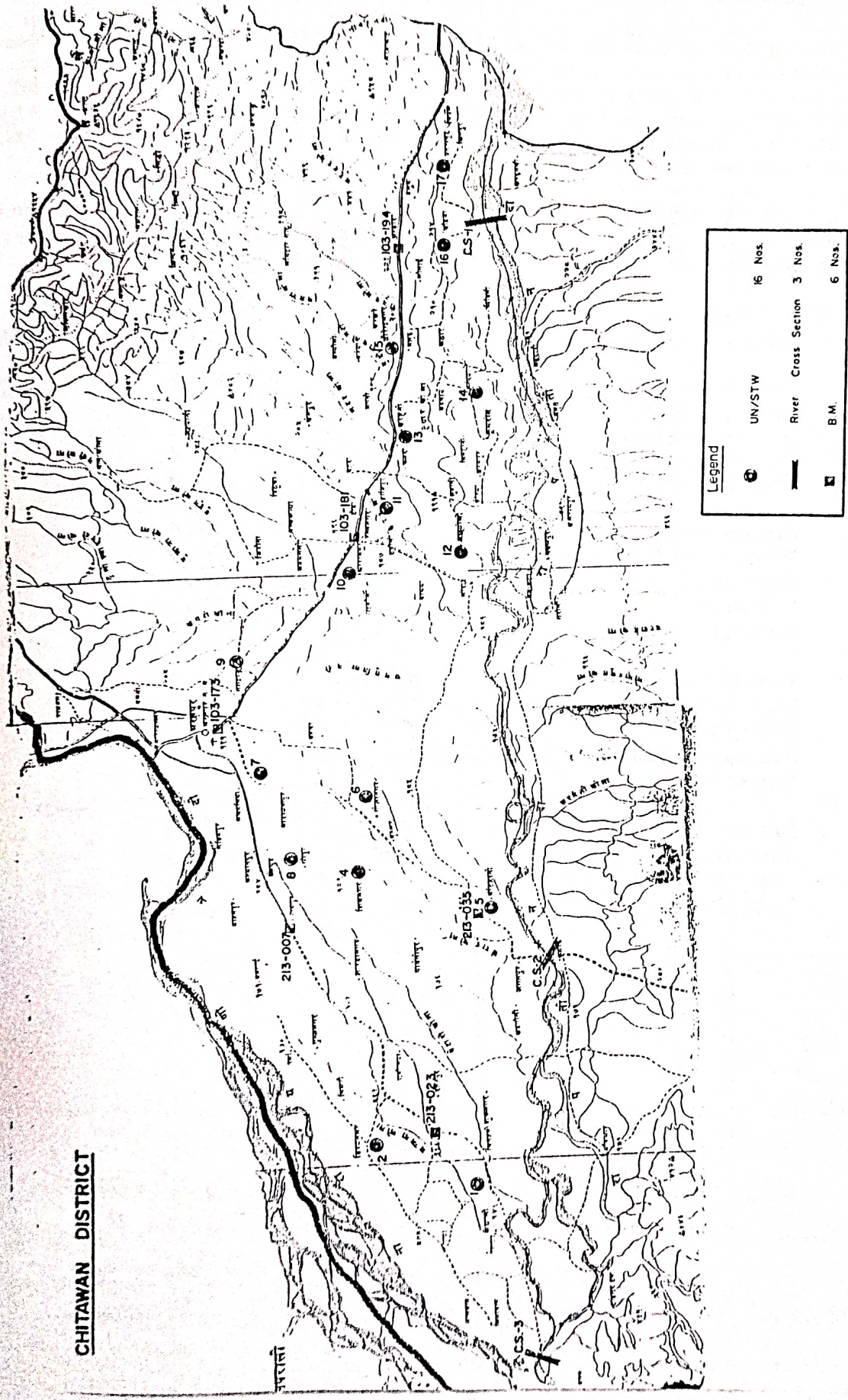


Figure 54.--Map of Chitawan District showing locations of wells and cross sections of streams.

Chitwan District

Land surface altitudes at 16 wells and the water surface altitudes at 3 stream cross sections were determined in Chitwan District. There were 16 UN wells and 3 stream cross sections surveyed. Locations are shown on the district map, Figure 54; altitudes are listed in Table 6; sketches of the wells and cross sections are shown in Figures 55 - 59.

Table 6.--Well number, village or stream name, ward number, and altitude of land surface at the well or water surface in the stream in meters above sea level in Chitwan District.

<u>Well Number</u>	<u>Village or Stream Name</u>	<u>Ward Number</u>	<u>Altitude of Land or Stream Surface</u>
UN 1	Parsadav	3	150.7
UN 2	Dibya Nagar	9	160.0
UN 4	Shiva Nagar	9	188.2
UN 5	Patihani	9	178.4
UN 6	Geeta Nagar	5	187.9
UN 7	Gulab Bang	5	199.6
UN 8	Prem Basti	7	196.9
UN 9	Godrang	12	203.0
UN 10	Tikauli	9	189.1
UN 11	Belchi	1	191.0
UN 12	Barchhauri	8	187.2
UN 13	Khairahani	7	195.3
UN 14	Kapiya	8	197.8
UN 15	Birendra Nagar	3	209.4
UN 16	Parariya	5	216.8
UN 17	Pratappur	2	229.0
CS 1	East Rapti River		216.8
CS 2	East Rapti River		172.5
CS 3	East Rapti River		161.3

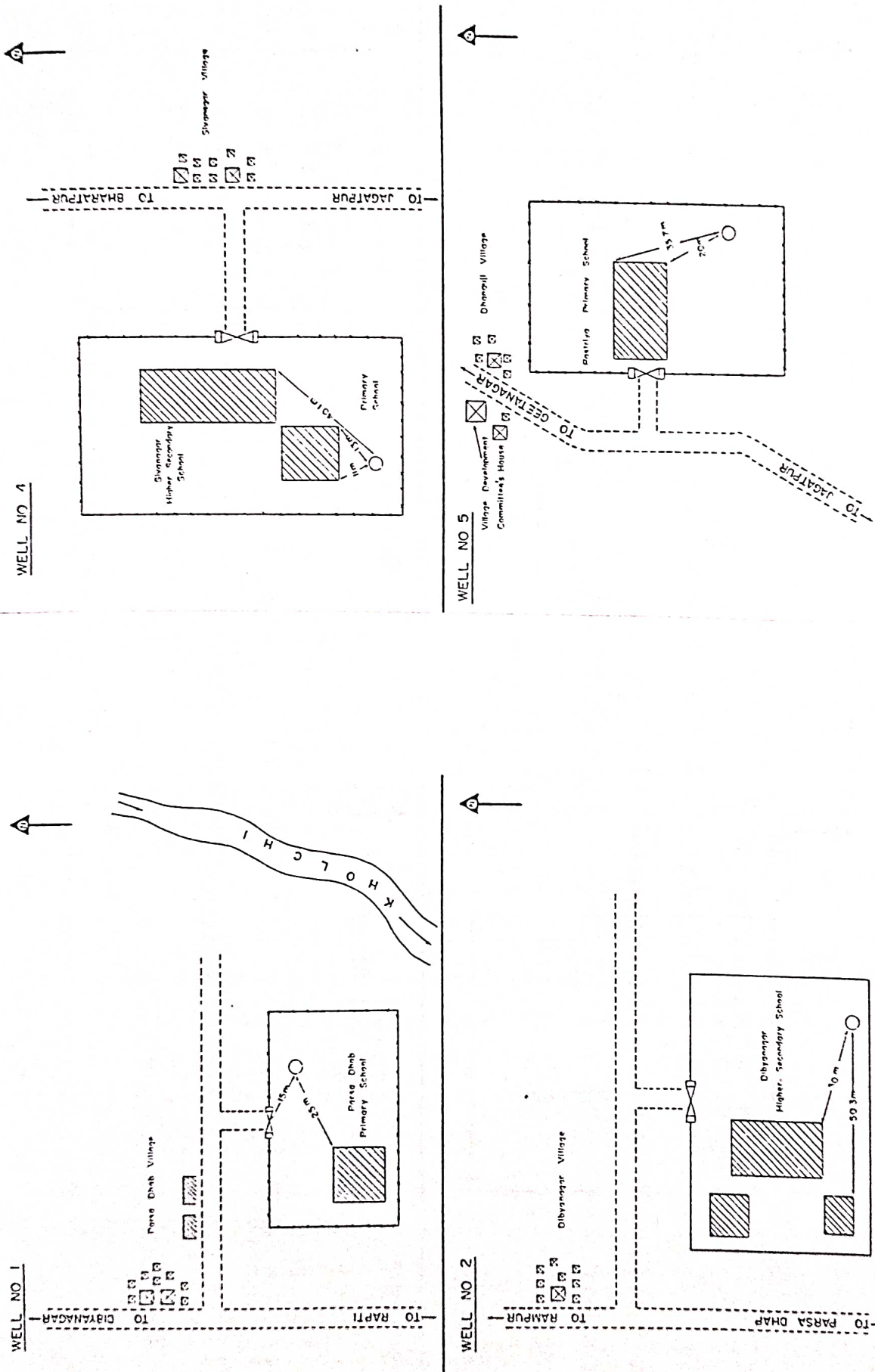


Figure 55.--Sketches of wells 1, 2, 4, 5 in Chitwan District.

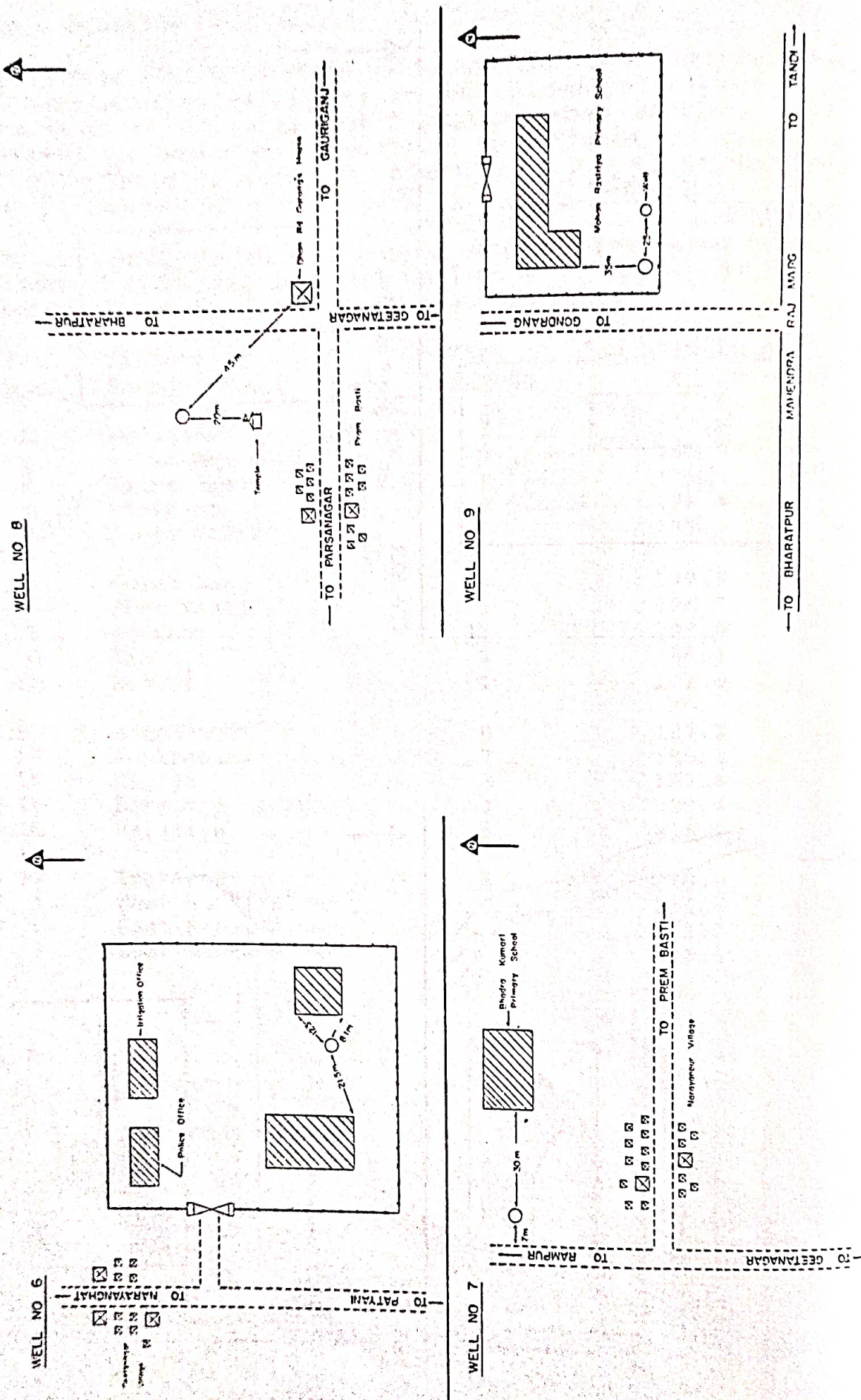


Figure 56.--Sketches of wells 6 - 9 in Chitwan District.

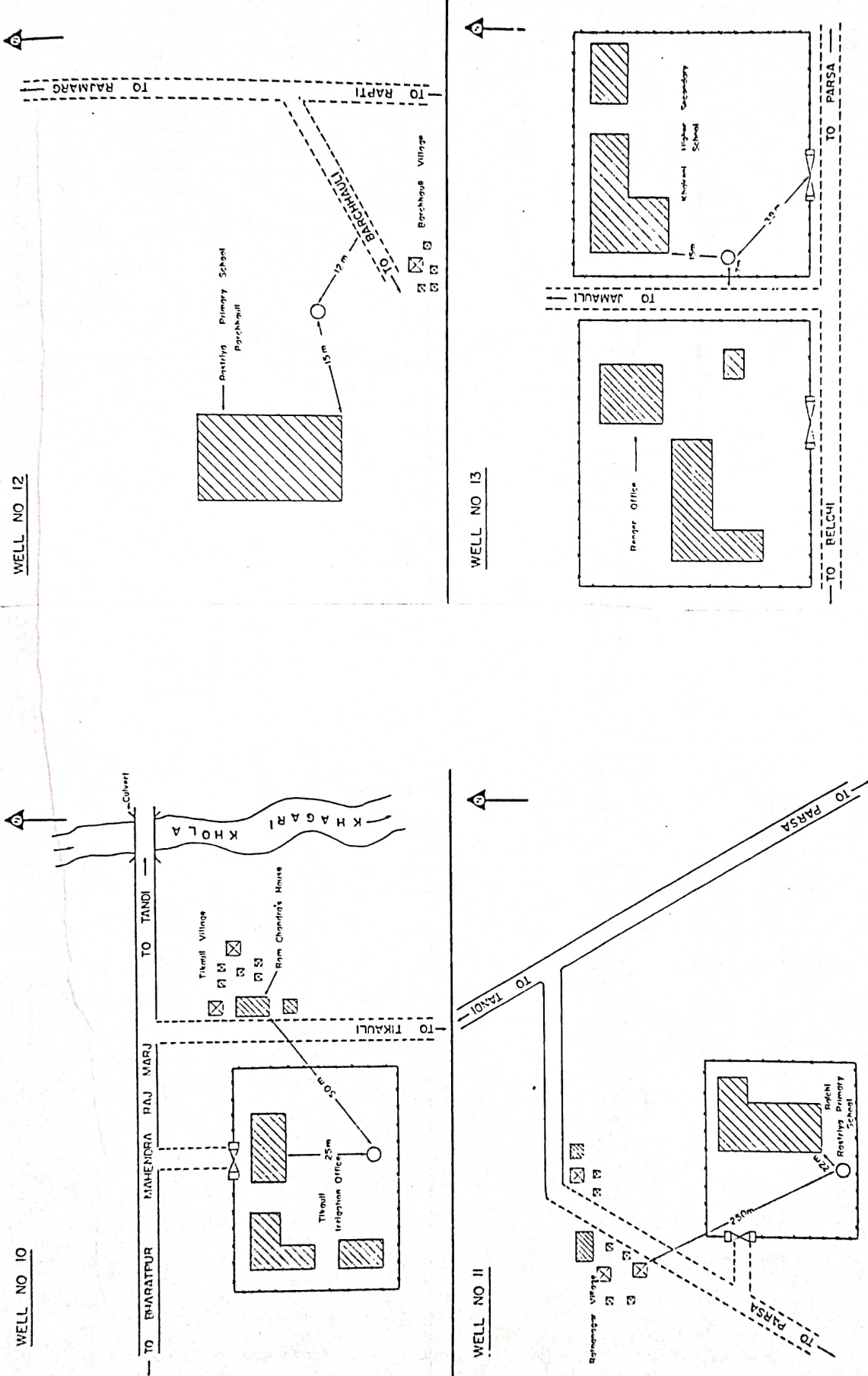


Figure 57.--Sketches of wells 10 - 13 in Chitwan District.

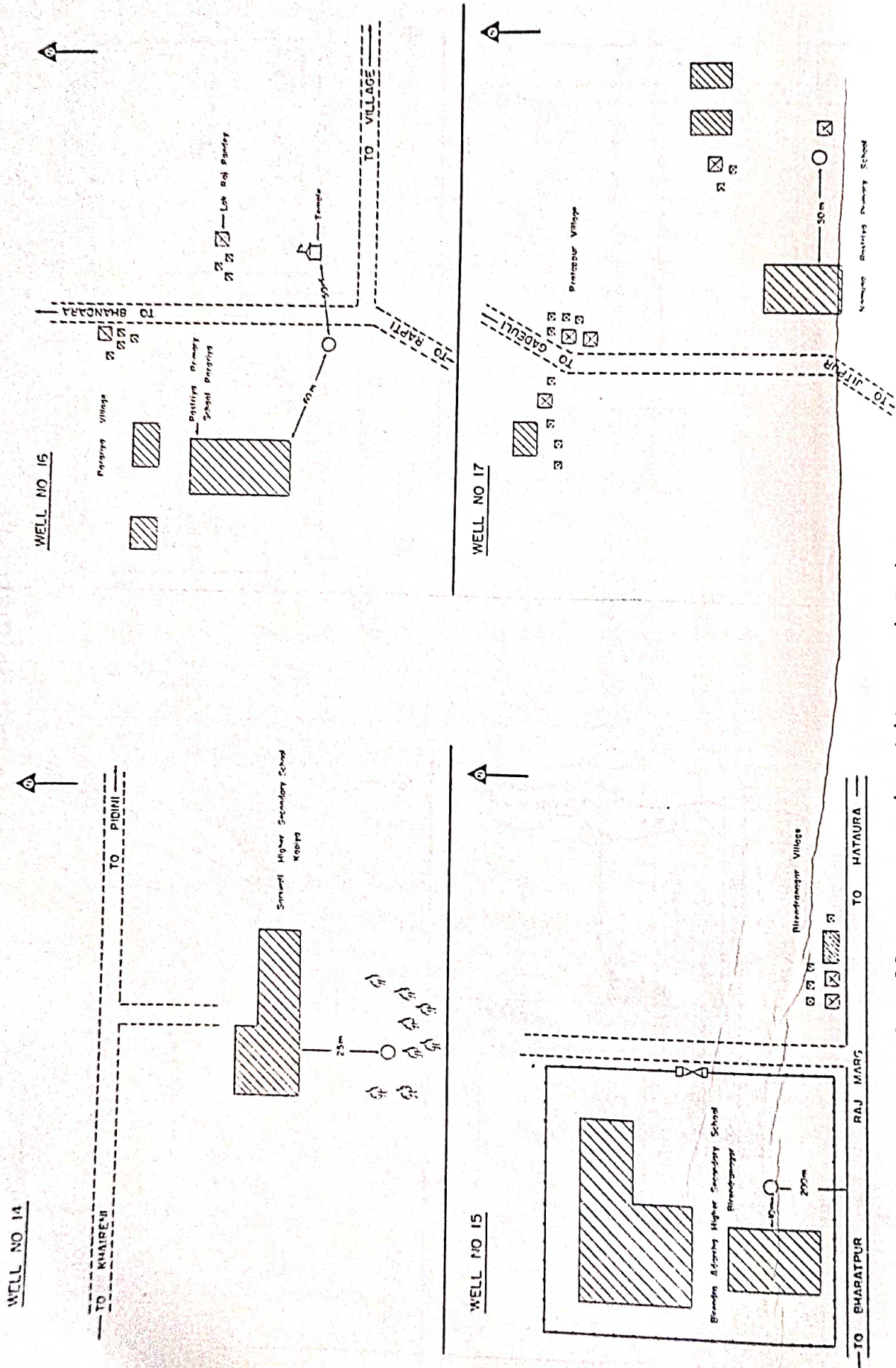


Figure 58.--Sketches of wells 14 - 17 in Chitwan District.

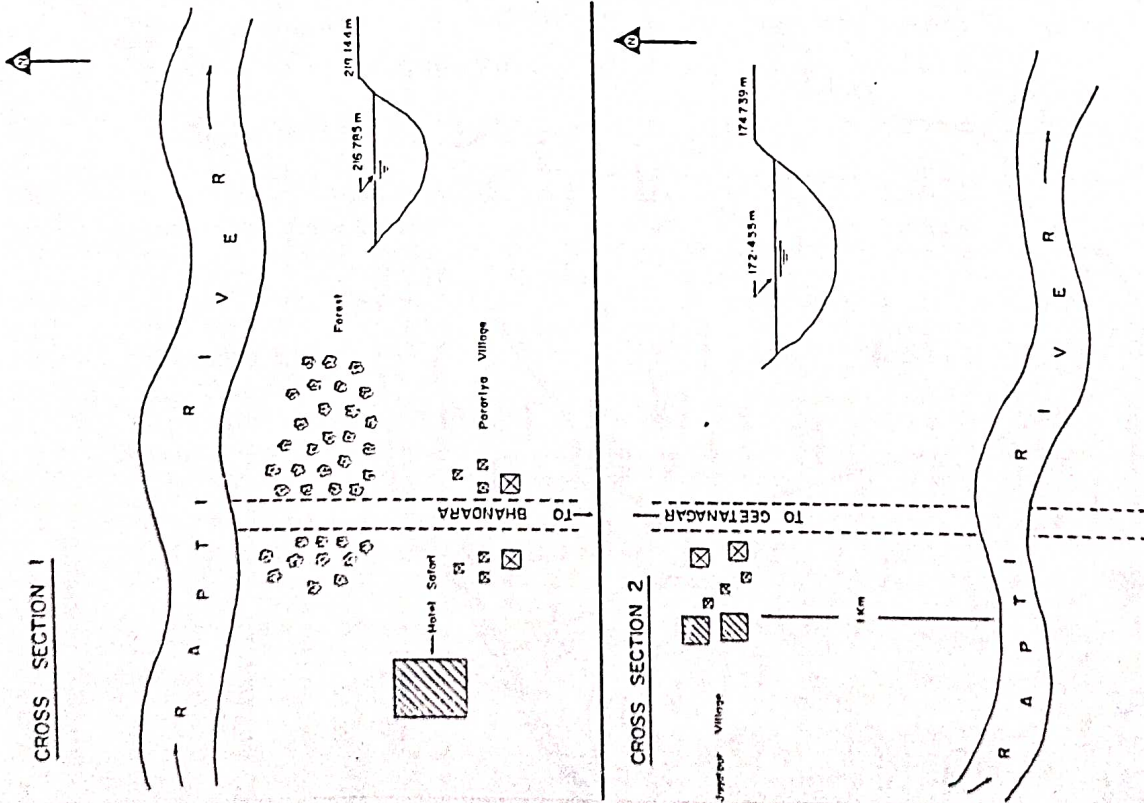
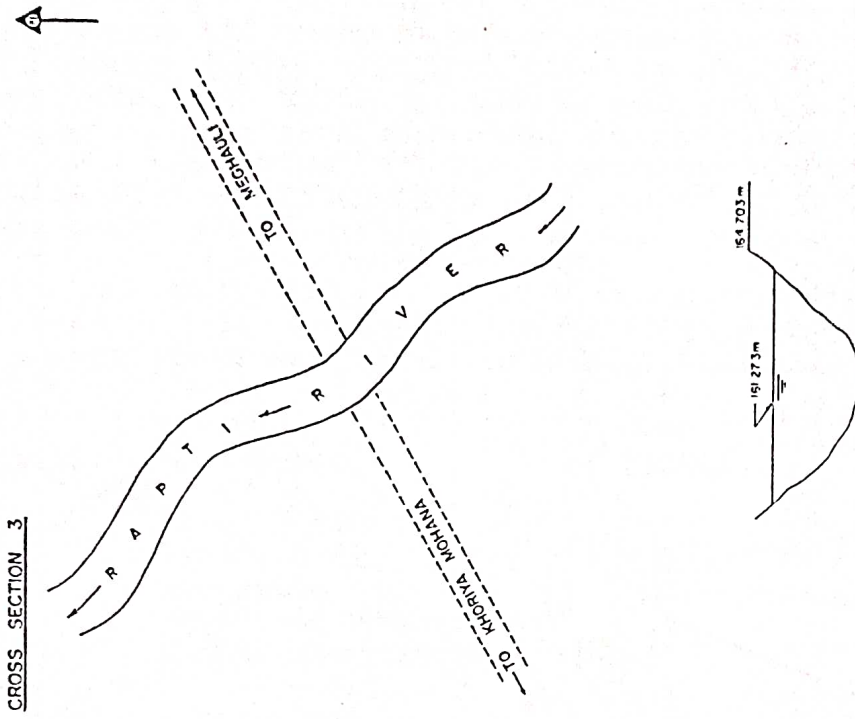


Figure 59.--Sketches of sections 1 - 3 in Chitwan District.

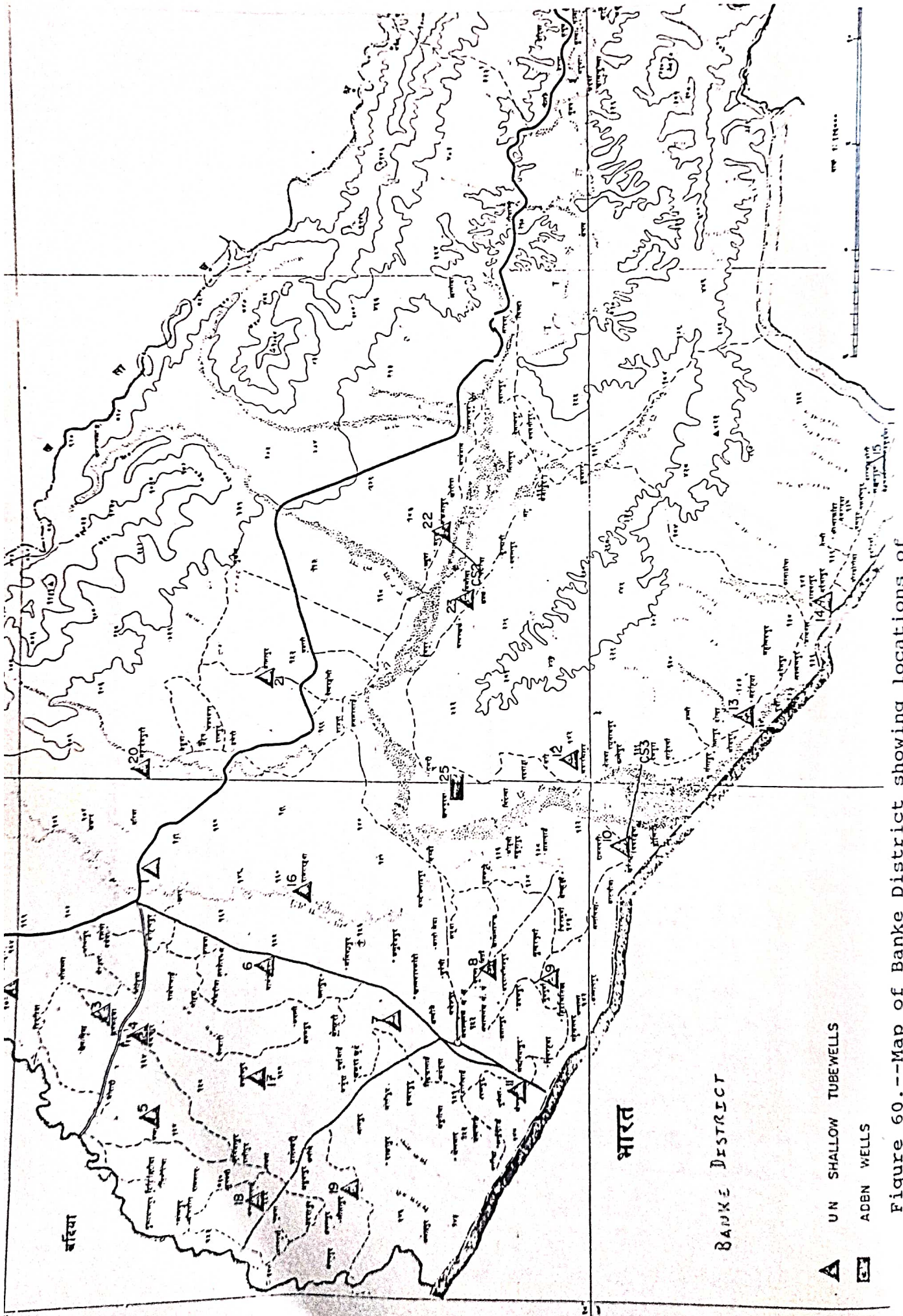


Figure 60.--Map of Banke District showing locations of wells and cross sections of streams.

Banke District

Land surface altitudes at 24 wells and the water surface altitudes at 2 stream cross sections were determined in Banke District. There were 23 UN wells, 1 private well and 2 stream cross sections surveyed. Locations are shown on the district map, Figure 60; altitudes are listed in Table 7; sketches of the wells are shown in Figures 61 - 67. There are no sketches of the cross sections for Banke District.

Table 7.--Well number, village or stream name, ward number, and altitude of land surface at the well or water surface in the stream in meters above sea level in Banke District.

<u>Well Number</u>	<u>Village or Stream Name</u>	<u>Ward Number</u>	<u>Altitude of Land or Stream Surface</u>
UN 1	Dhatuwa/Kohalpur	4	172.5
UN 2	Jabdahawa	5	173.1
UN 3	Bankatuwa	7	164.5
UN 4	Channawa/Samshergunj	4	163.8
UN 5	Thapawa/Bankatuwa	3	155.2
UN 6	Piparahawa	7	155.4
UN 7	Bhujai/Khaskando	2	151.8
UN 8	Birta/Puraina	7	148.4
UN 9	Shikhanpura/Hisminiya	6	143.1
UN 10	Kharaincha Huliya	3	134.9
UN 11	Jaishpur	5	147.6
UN 12	Phatepur	7	135.7
UN 13	Matehia	5	133.2
UN 14	Narainapur	6	140.2
UN 15	Majhatiya/Kathkuiya	3	136.2
UN 16	Rajgar hawa	8	157.4
UN 17	Bageshori	4	158.1
UN 18	Kalhansgaon/Sonapur	7	155.1
UN 19	Gaughat/Radhapur	4	146.4
UN 20	Mahadevpuri	6	172.6
UN 21	Balampur	2	153.5
UN 22	Kanchanpur	3	162.1
UN 23	Binauna	6	158.9
AD 1	Chakpuruwa/Phatepur	9	141.8
CS 2	West Rapti River (Binauna to Kanchanpur)		153.2
CS 3	West Rapti River (Piparaha to Phatepur)		131.5

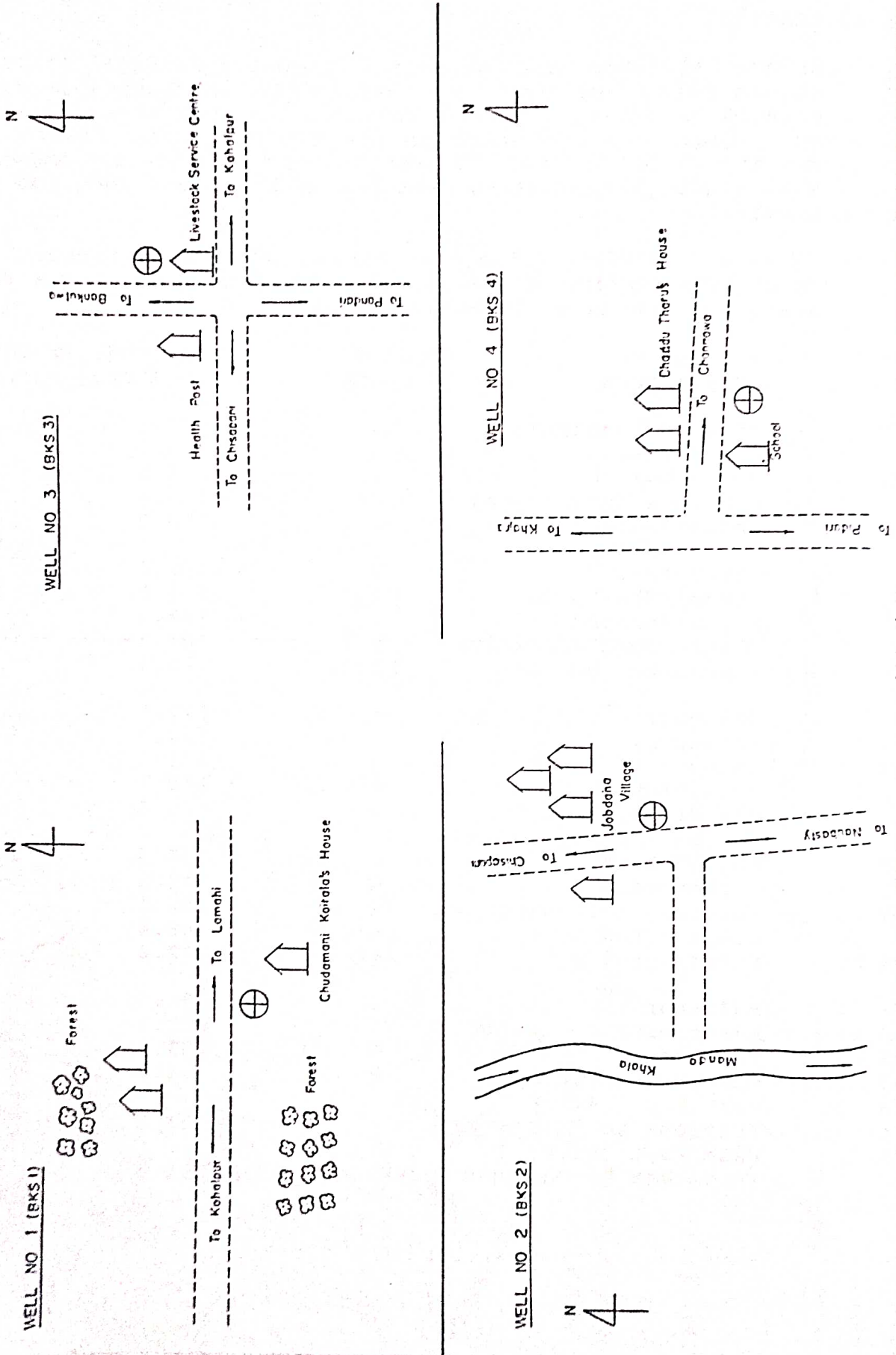


Figure 61.--Sketches of wells 1 - 4 in Banke District.

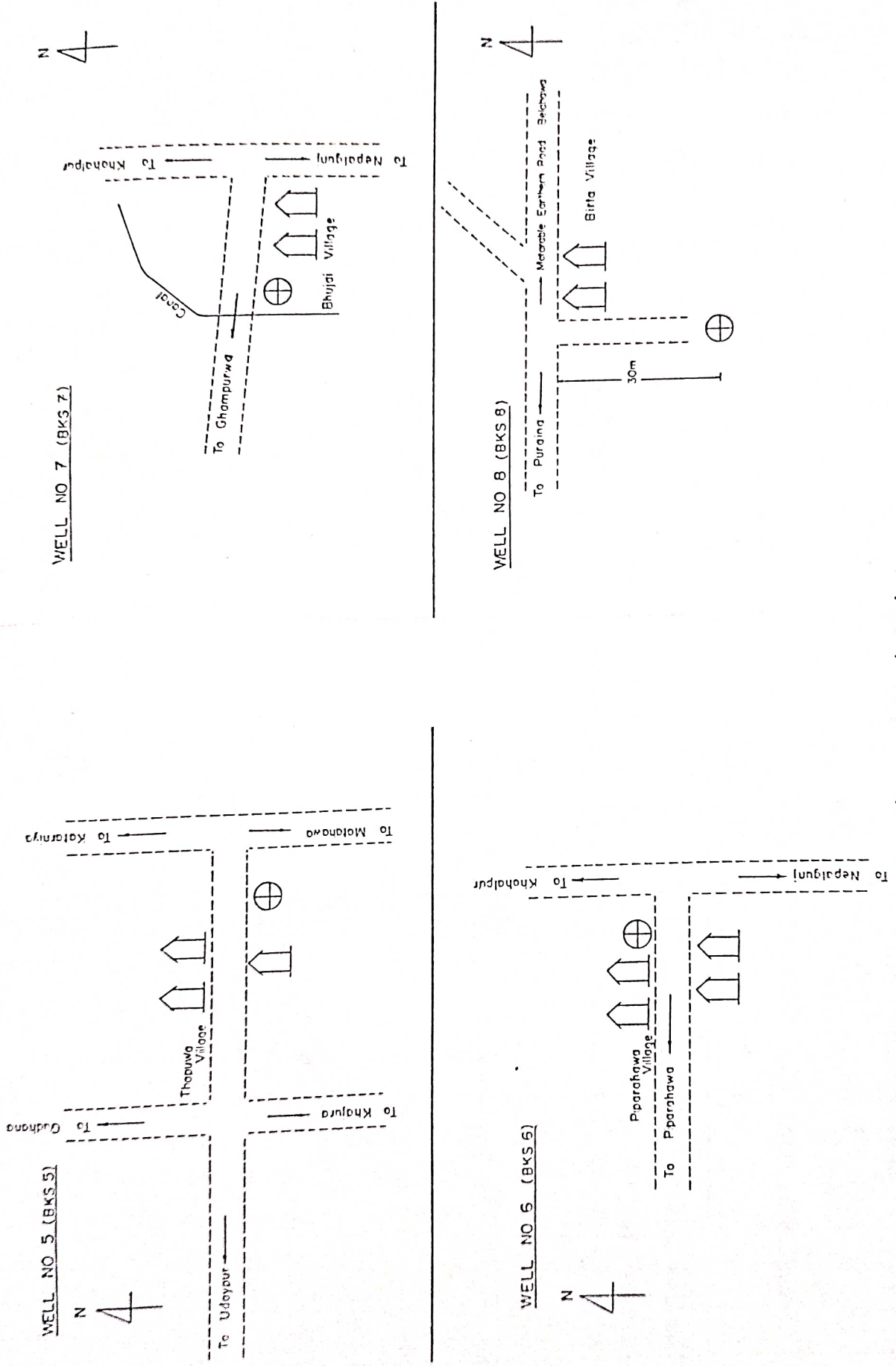


Figure 62.--Sketches of wells 5 - 8 in Banke District.

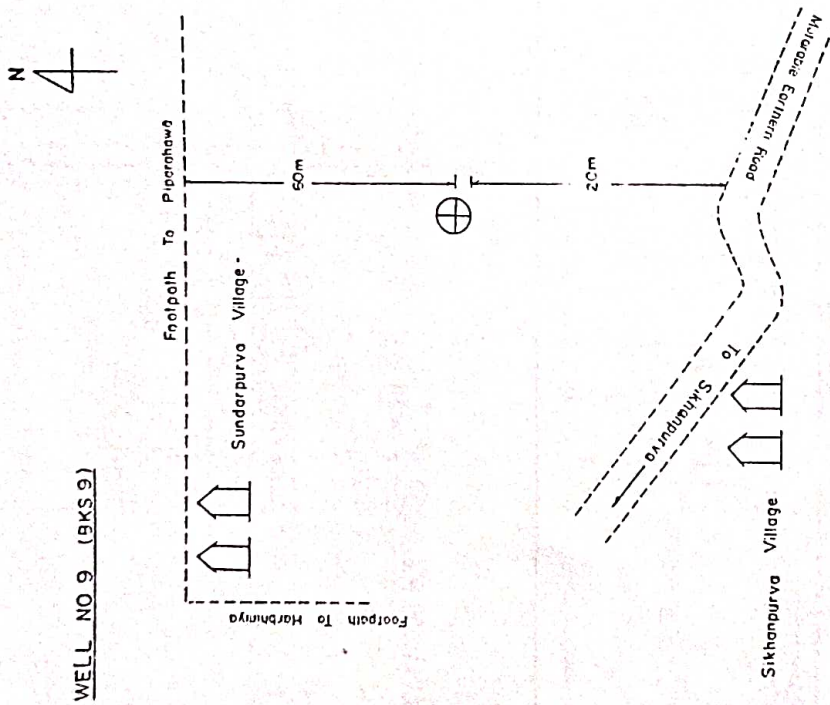
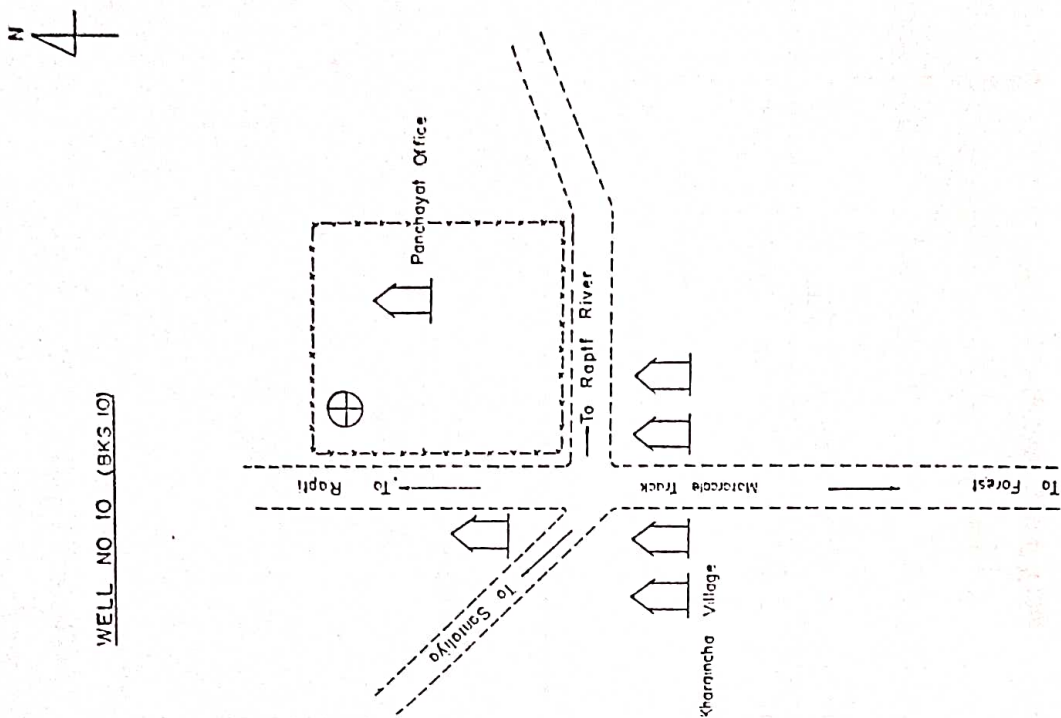


Figure 63.--Sketches of wells 9 - 10 in Banke District.

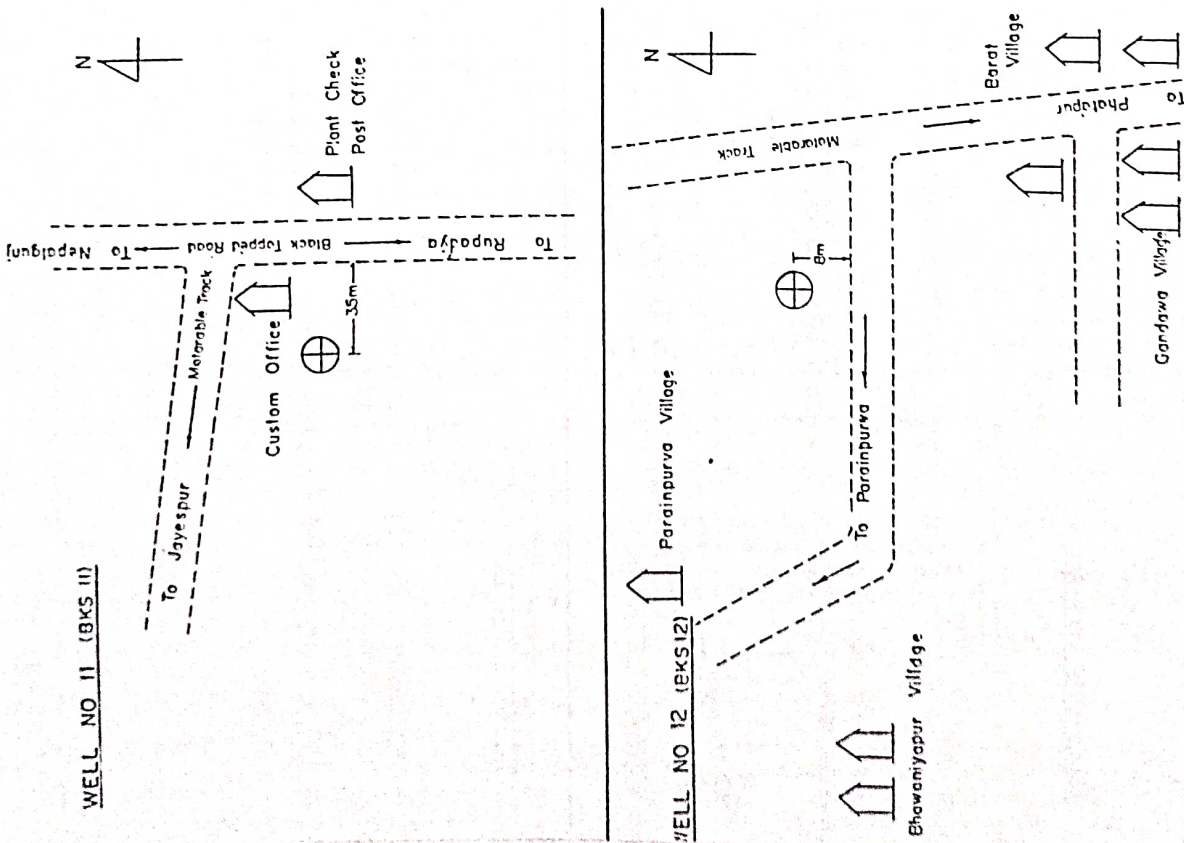
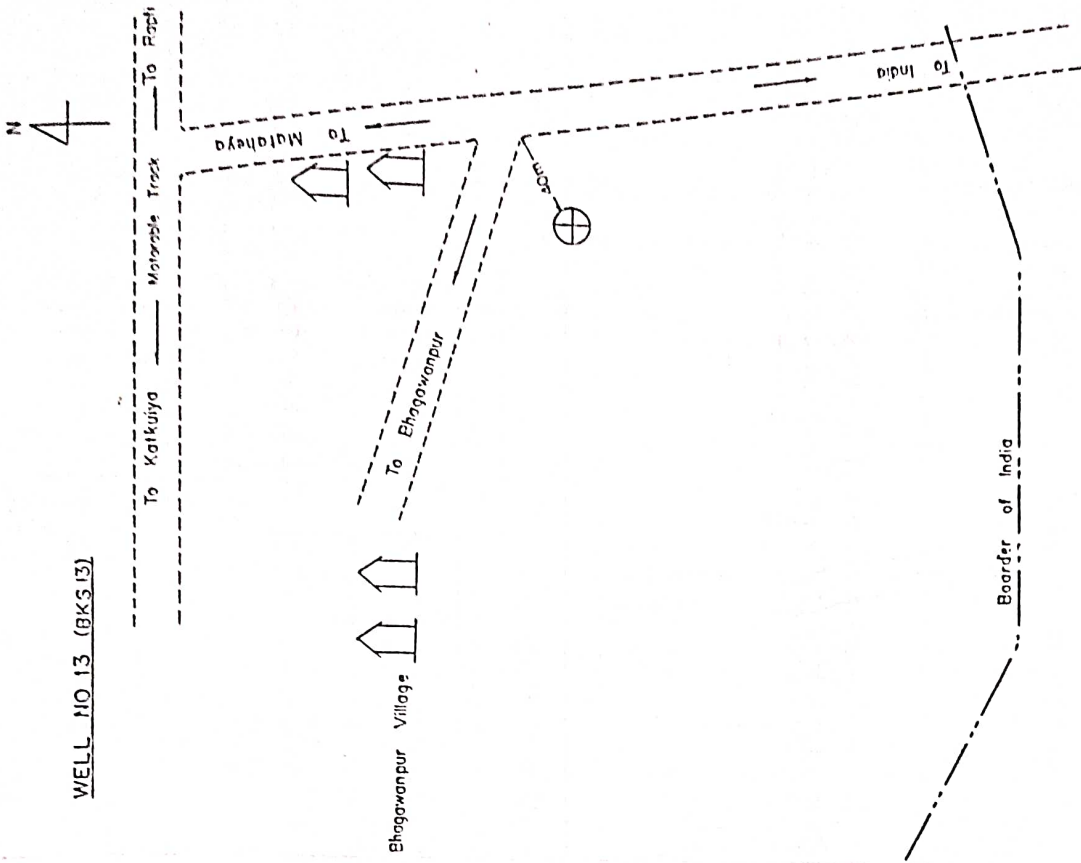


Figure 64.--Sketches of wells 11 - 13 in Banke District.

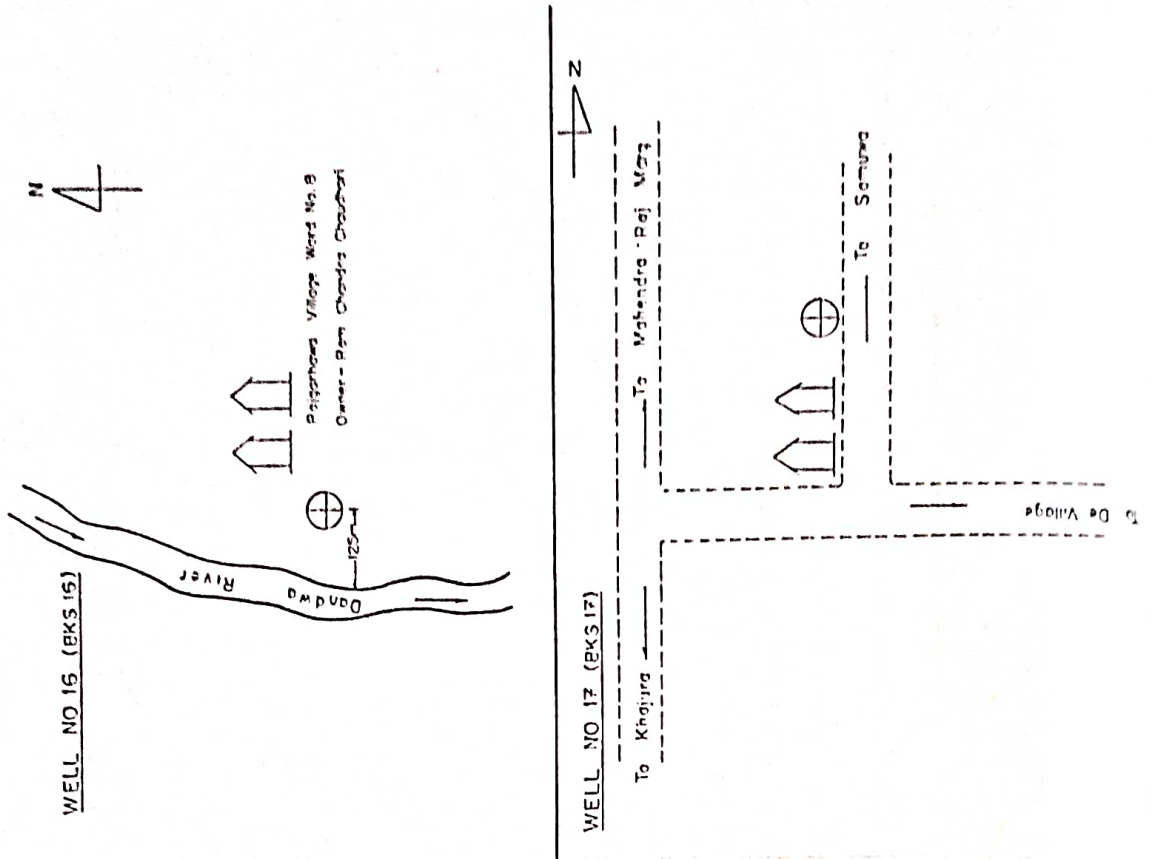


Figure 65. --Sketches of wells 14 - 17 in Banke District.

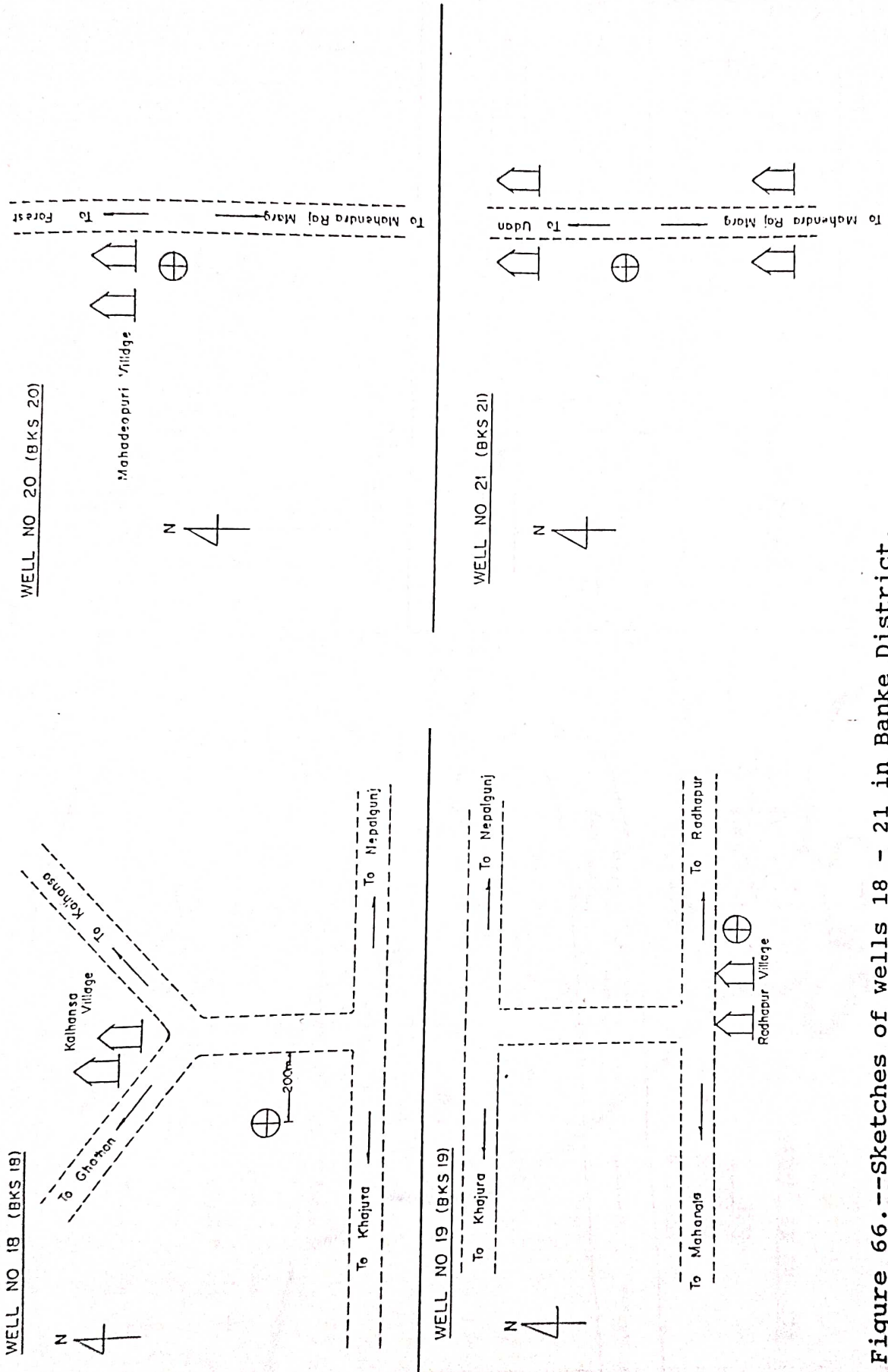


Figure 66.--Sketches of wells 18 - 21 in Banke District.

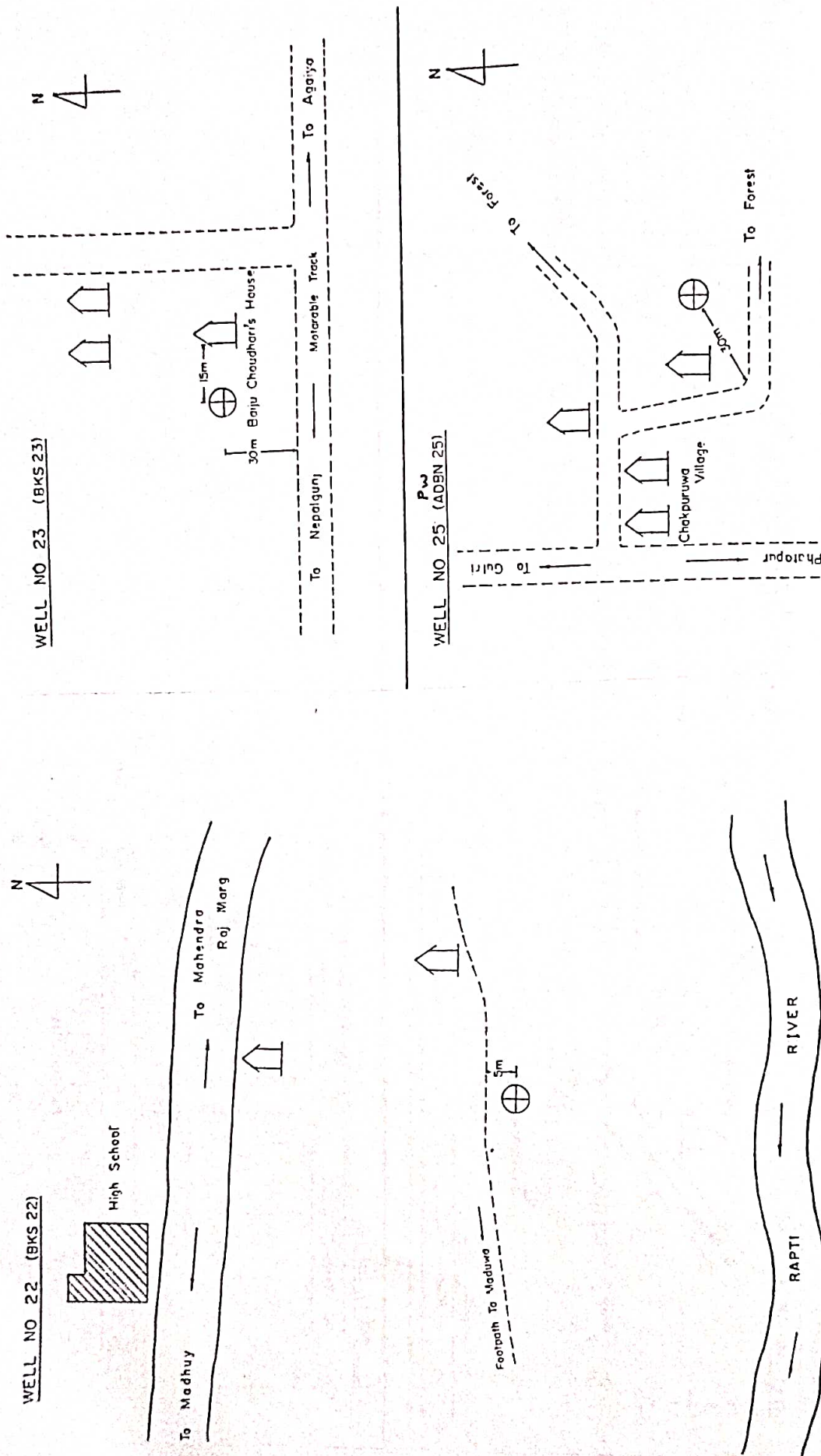


Figure 67.--Sketches of wells 22, 23, PW 25 in Banke District.

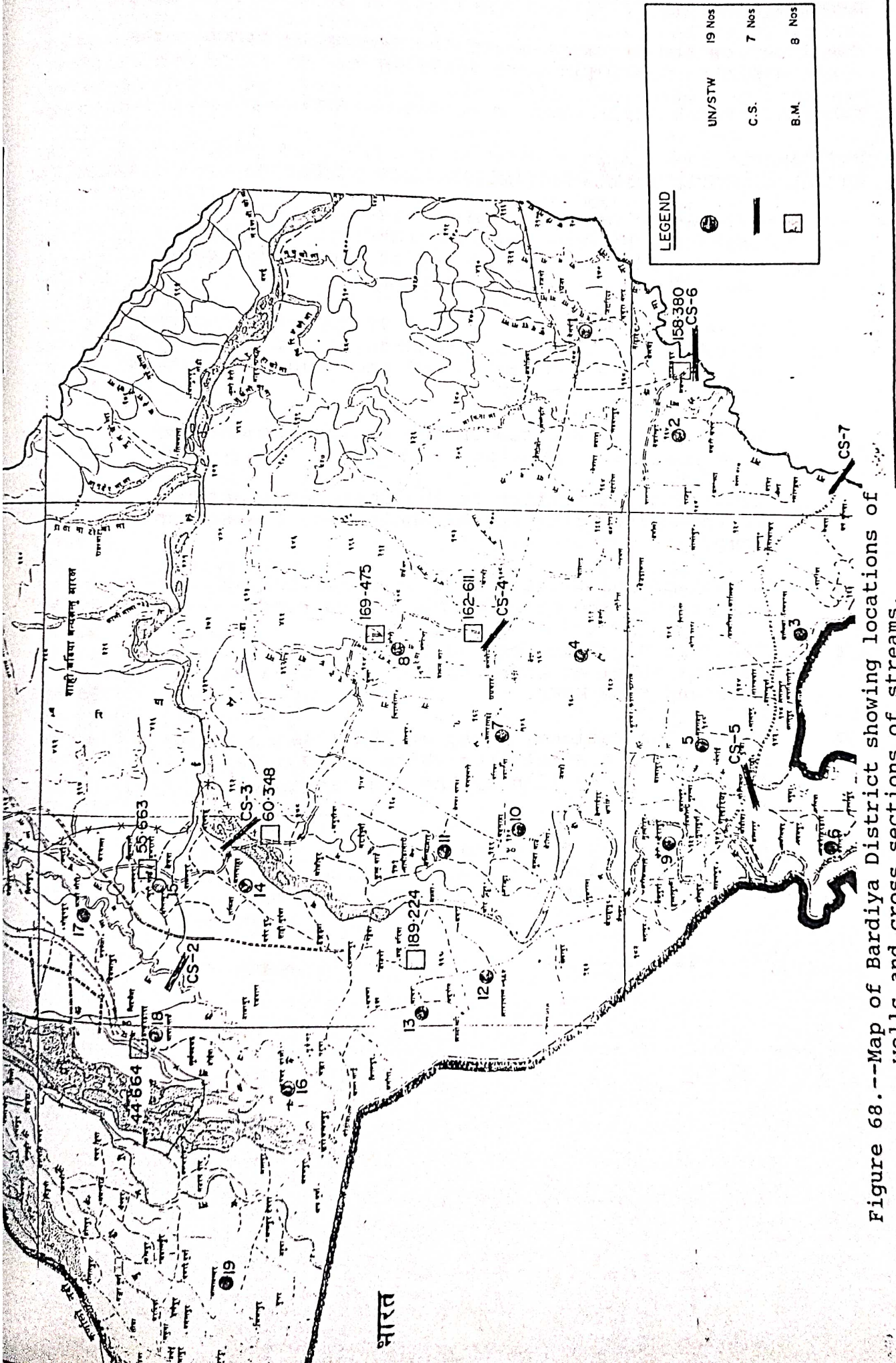


Figure 68.--Map of Bardiya District showing locations of wells and cross sections of streams.

Bardiya District

The location and description of the temporary bench marks used in Bardiya District are provided in Table 8.

Table 8.--Bench marks used in Bardiya District.

<u>Serial Number</u>	<u>Location and Description of Bench Marks</u>	<u>Elevation</u>
1	Elevation brought from BM fixed by Kohalpur-Mahakali Highway Project (KMHP) at Kohalpur was written on the parapet of the bridge over Maan Khola on Mahendra Highway.	158.380
2	Temporary bench mark (TBM) # 37 concrete peg was fixed in the forest of Thakurdwara and located 25 m left of the center line of the road. Elevation was received from KMHP.	44.664
3	Elevation was written on the south side of the pipe culvert at Station 16+380.	162.611
4	Elevation was written on the south west parapet of the bridge over Aurahi Khola near the Korean Camp.	169.475
5	Elevation was written on a pipe culvert at Sainwar village on left side of the road.	60.348
6	TBM # 23 concrete peg was fixed nearby the Lumbini Hotel at Bhuri Gaun. Elevation was received from KMHP.	55.663
7	Inside the National Park, as TBM # 183 a nail driven into a Simal tree which is 30 m left from the center line of the road at about Station 141+550.	75.112
8	A concrete peg fixed and located at the back of the cement godown of Samhu Construction Ltd. with elevation written on wall of the godown.	189.244

Land surface altitudes at 19 wells and the water surface altitudes at 7 stream cross sections were determined in Bardiya District. There were 19 UN wells and 7 stream cross sections surveyed. Locations are shown on the district map, Figure 68; altitudes are listed in Table 9; sketches of the wells and cross sections are shown in Figures 69 - 75.

Table 9.--Well number, village or stream name, ward number, and altitude of land surface at the well or water surface in the stream in meters above sea level in Bardiya District.

<u>Well Number</u>	<u>Village or Stream Name</u>	<u>Ward Number</u>	<u>Altitude of Land or Stream Surface</u>
UN 1	Betani	7	180.9
UN 2	Bakhari Khurd	6	161.3
UN 3	Maina Pokhar	1	30.9
UN 4	Bangai	6	163.4
UN 5	Bhaisahi	8	27.9
UN 6	Ram Nagar	6	24.0
UN 7	Magragadhi	2	151.7
UN 8	Aurahi	9	168.0
UN 9	Jain Purba	1	29.7
UN 10	Padnaha	1	149.5
UN 11	Baniya Bhar	8	155.7
UN 12	Tara Tal	5	36.3
UN 13	Madhuban	8	43.2
UN 14	Bagnaha	7	53.3
UN 15	Bhuri Gaun	7	54.9
UN 16	Pathar Bojhi	1	29.5
UN 17	Kali Gauri	9	57.3
UN 18	Thakurdwara	6	41.6
UN 19	Khallajayapur	6	33.3
CS 1	Aurahi Khola		72.7
CS 2	Aurahi Khola		40.7
CS 3	Babai River		183.0
CS 4	Bhada Khola		156.1
CS 5	Bhada Khola		19.4
CS 6	Maan Khola		151.6
CS 7	Maan Khola		22.

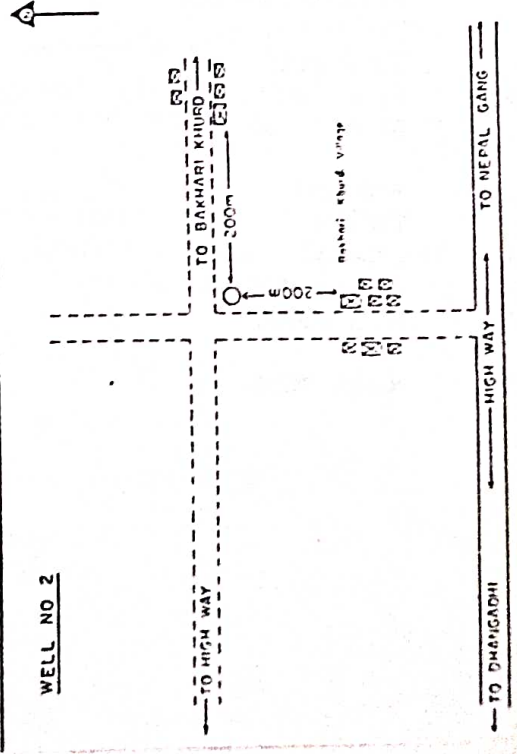
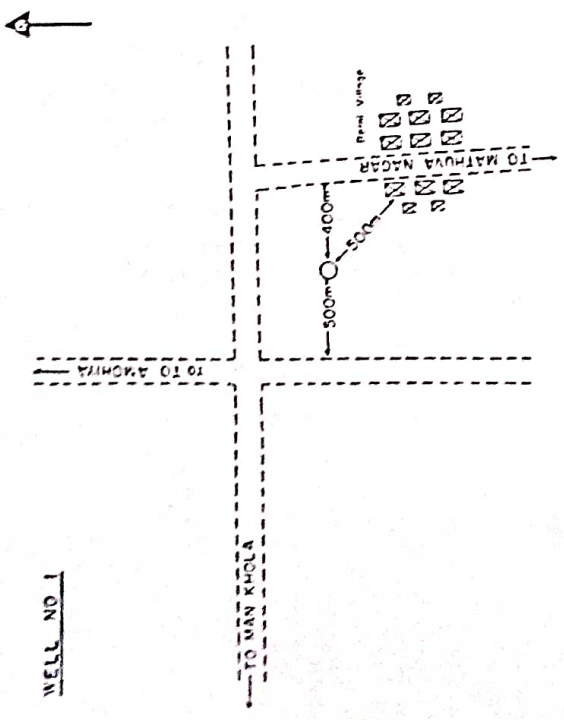
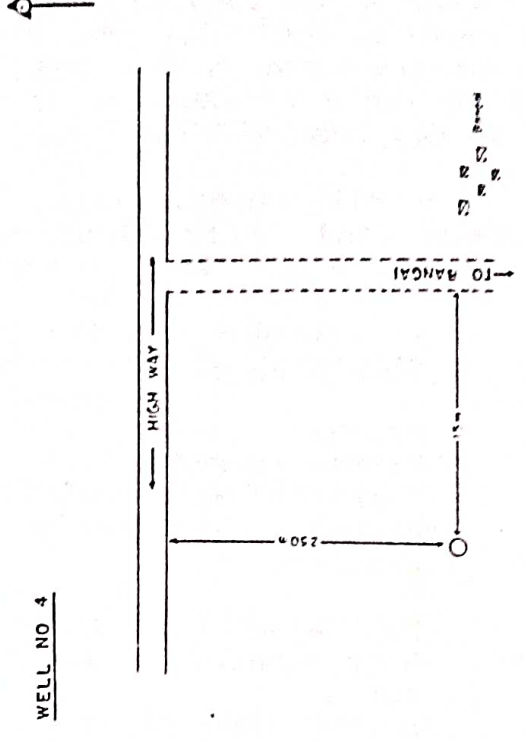
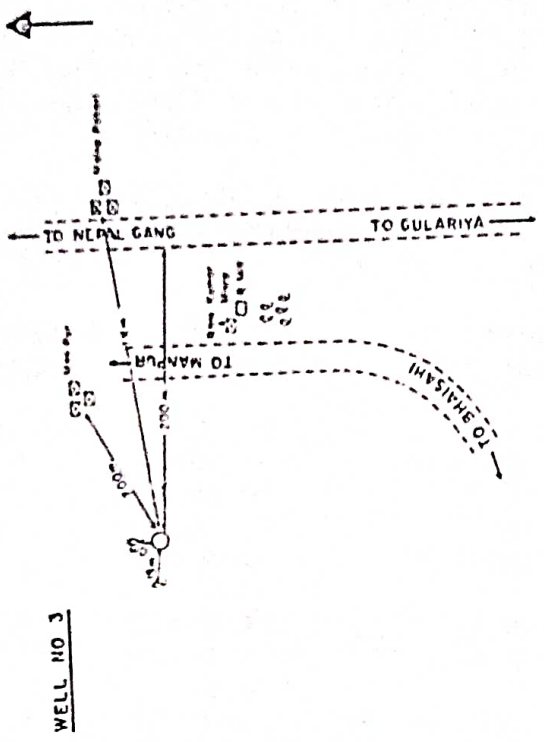


Figure 69.--Sketches of wells 1 - 4 in Bardiya District.

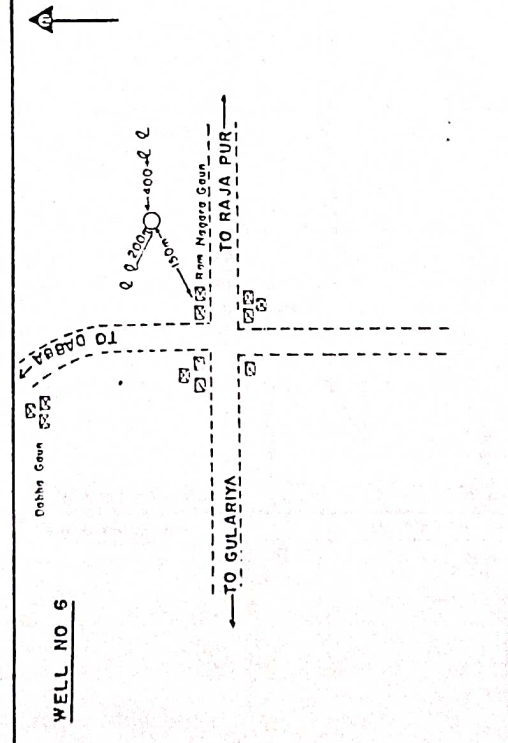
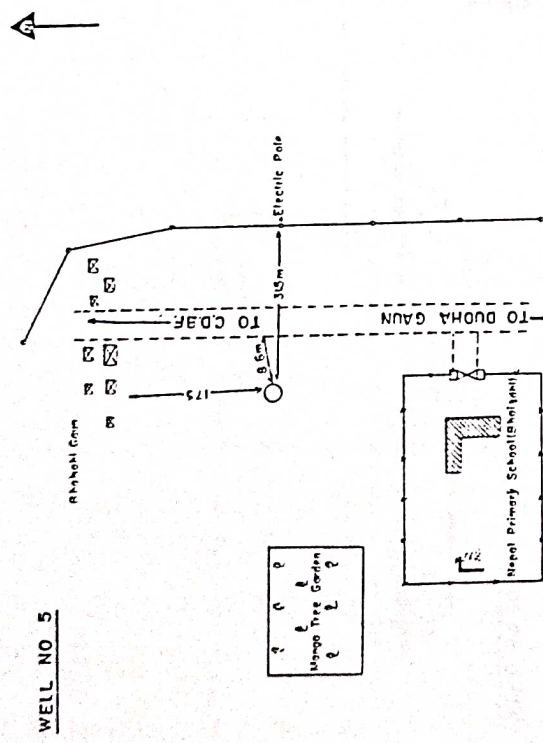
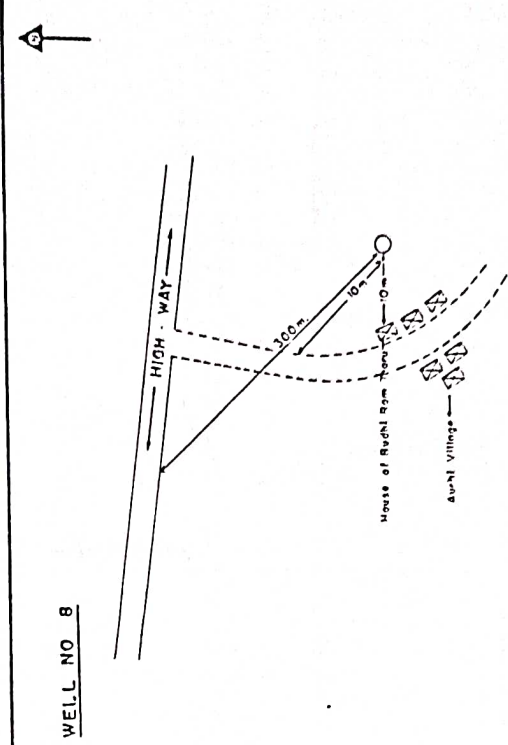
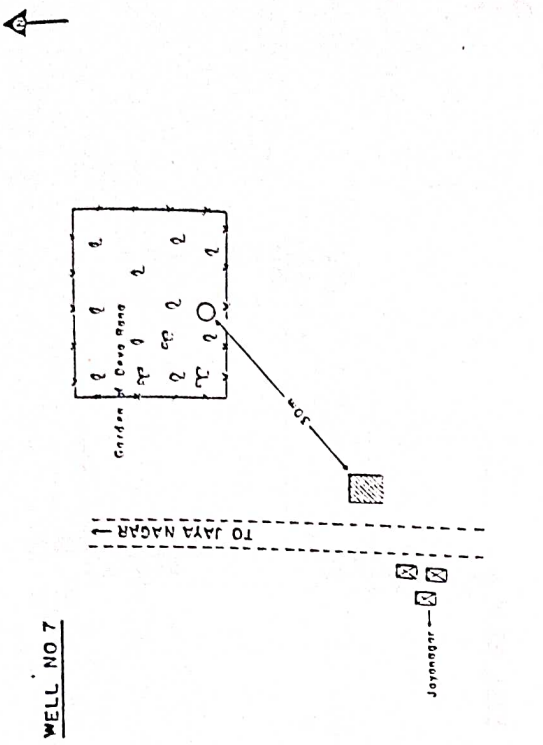


Figure 70.--Sketches of wells 5 - 8 in Bardiya District.

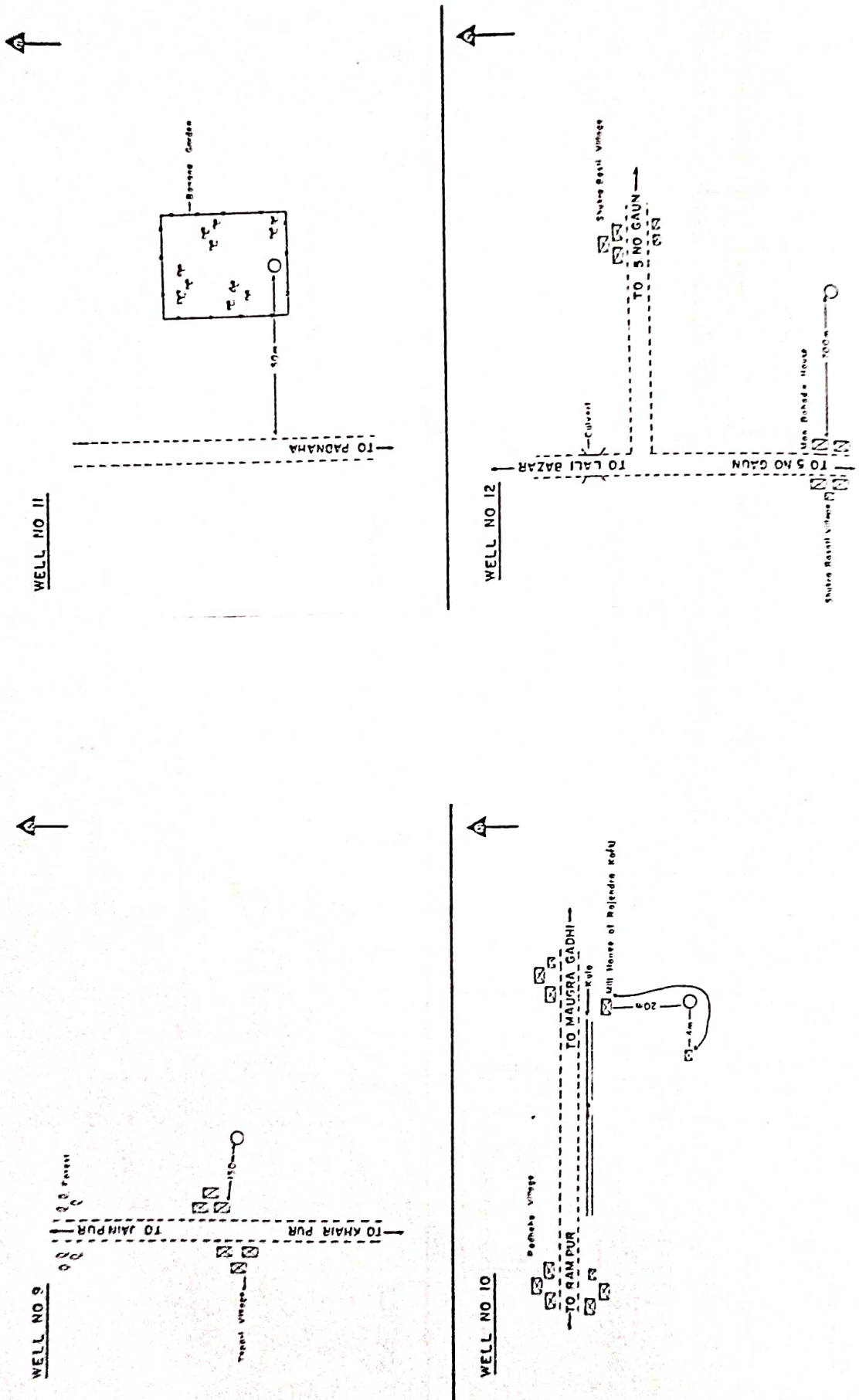
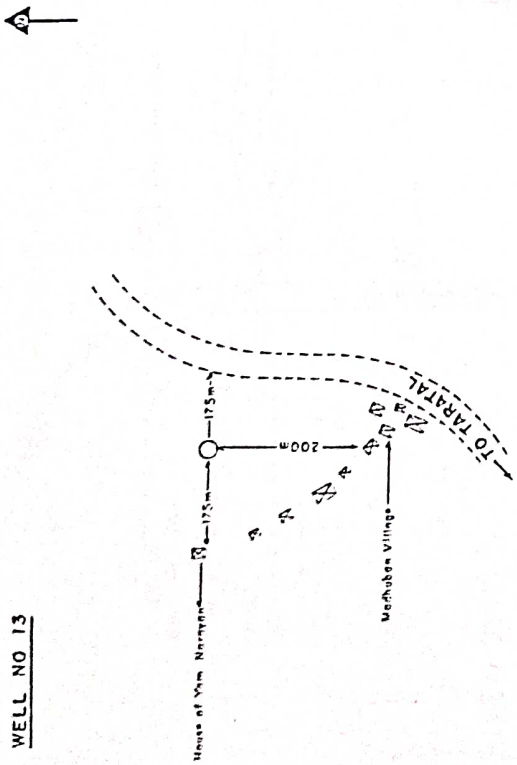
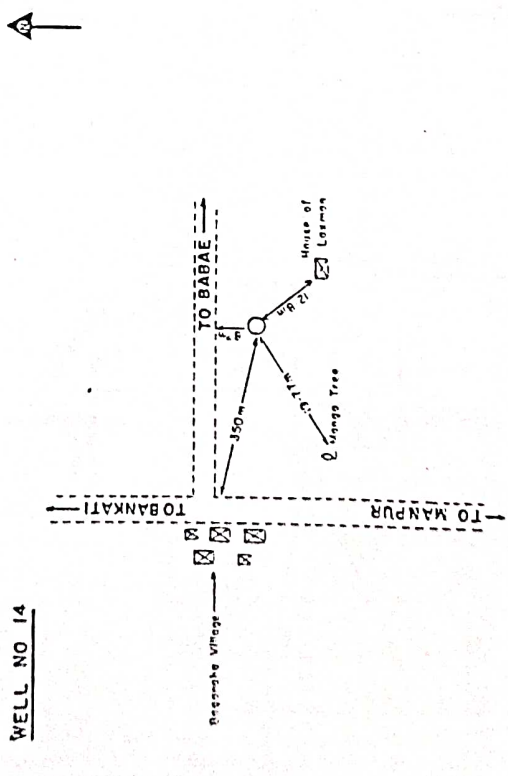
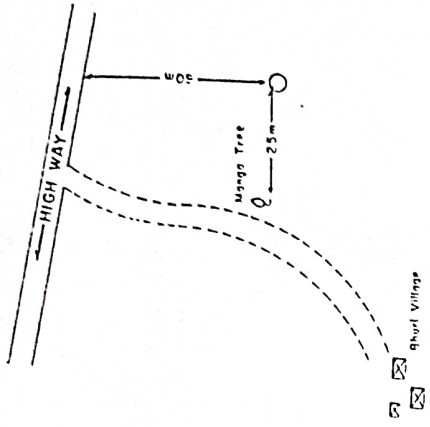


Figure 71.--Sketches of wells 9 - 12 in Bardiya District.



WELL NO 15



WELL NO 16

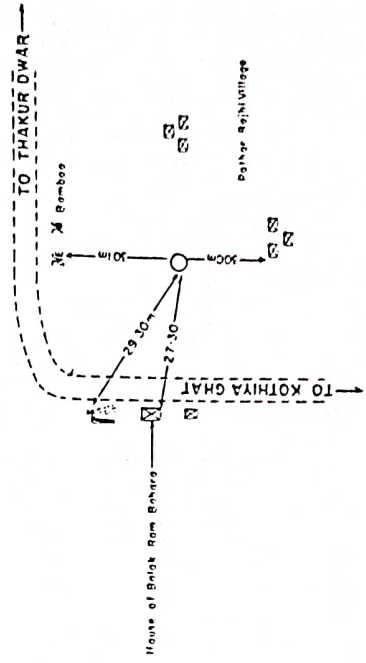


Figure 72.--Sketches of wells 13 - 16 in Bardiya District.

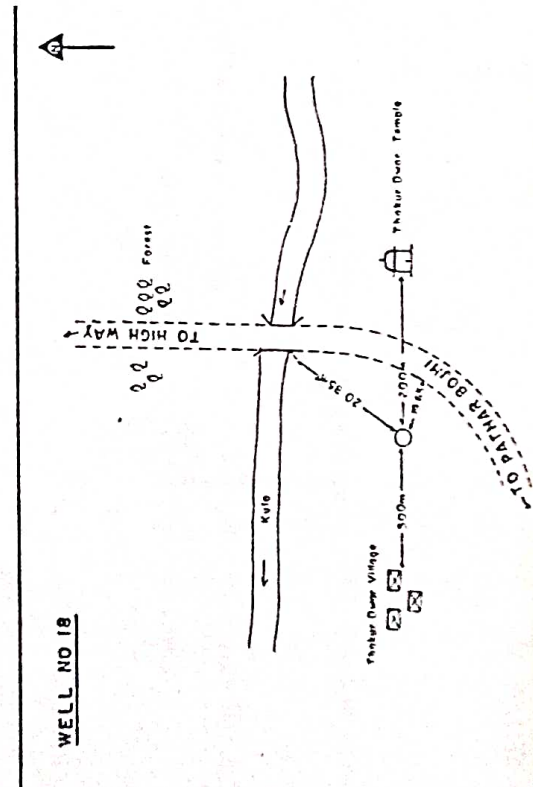
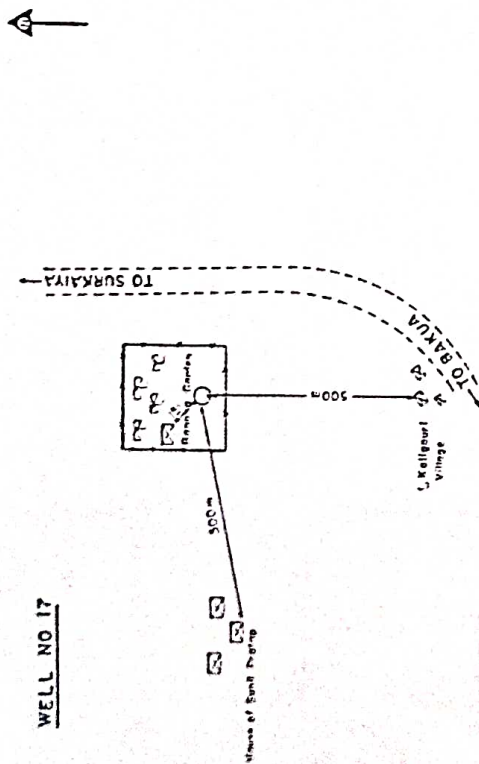
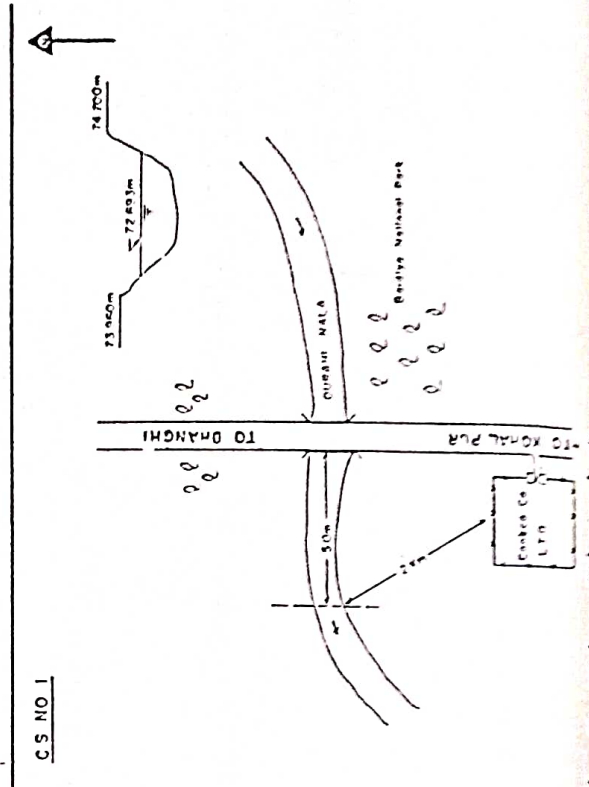
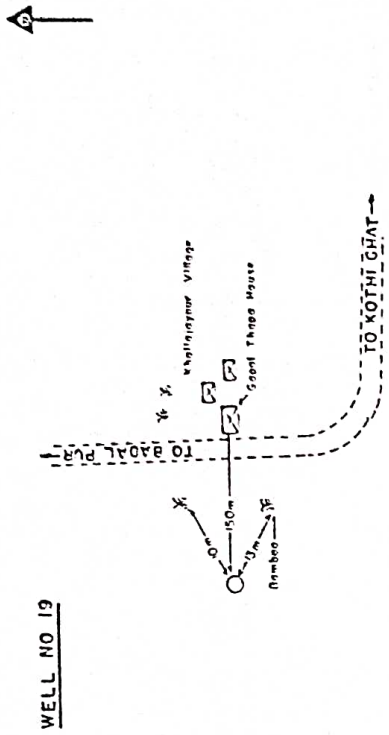


Figure 73.--Sketches of wells 17 - 19 and section 1 in Bardiya District.

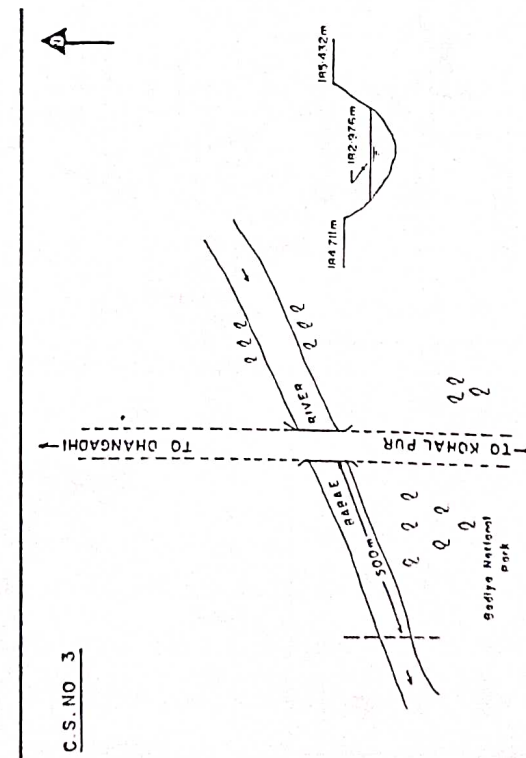
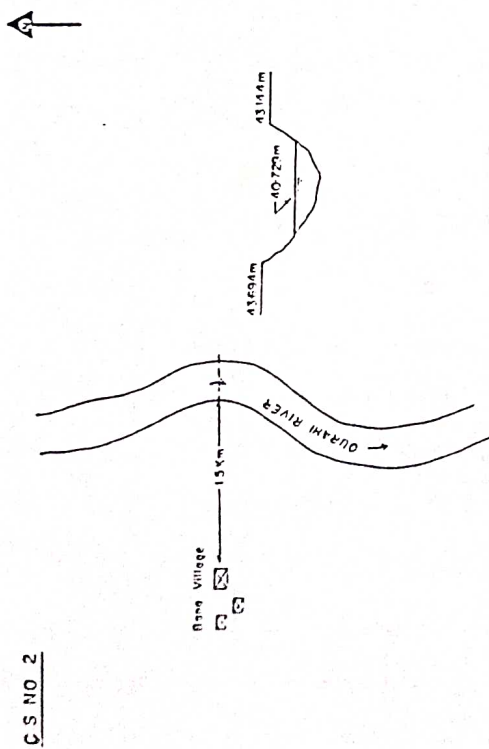
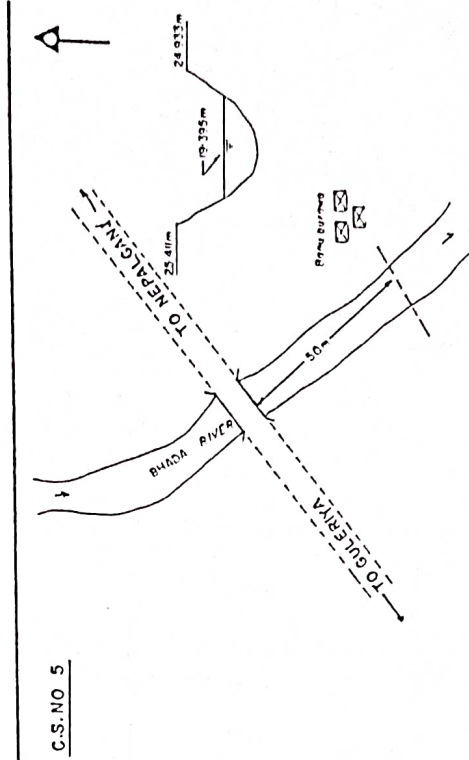
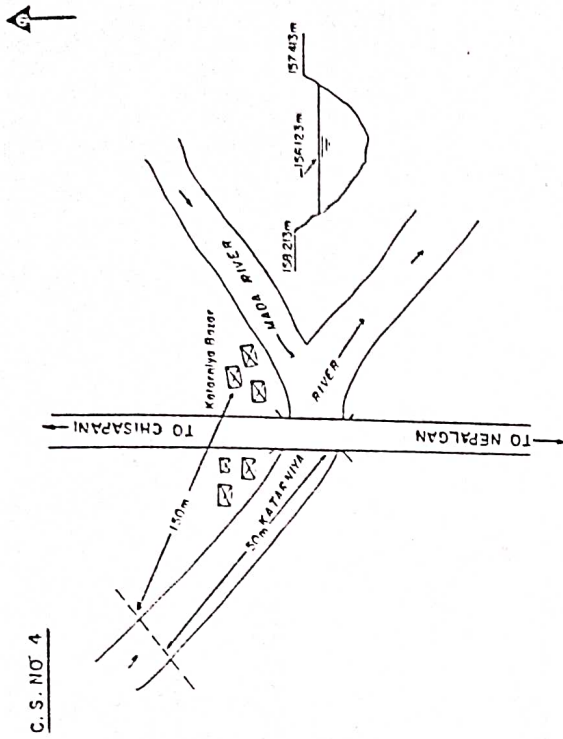


Figure 74.--Sketches of sections 2 - 5 in Bardiya District.

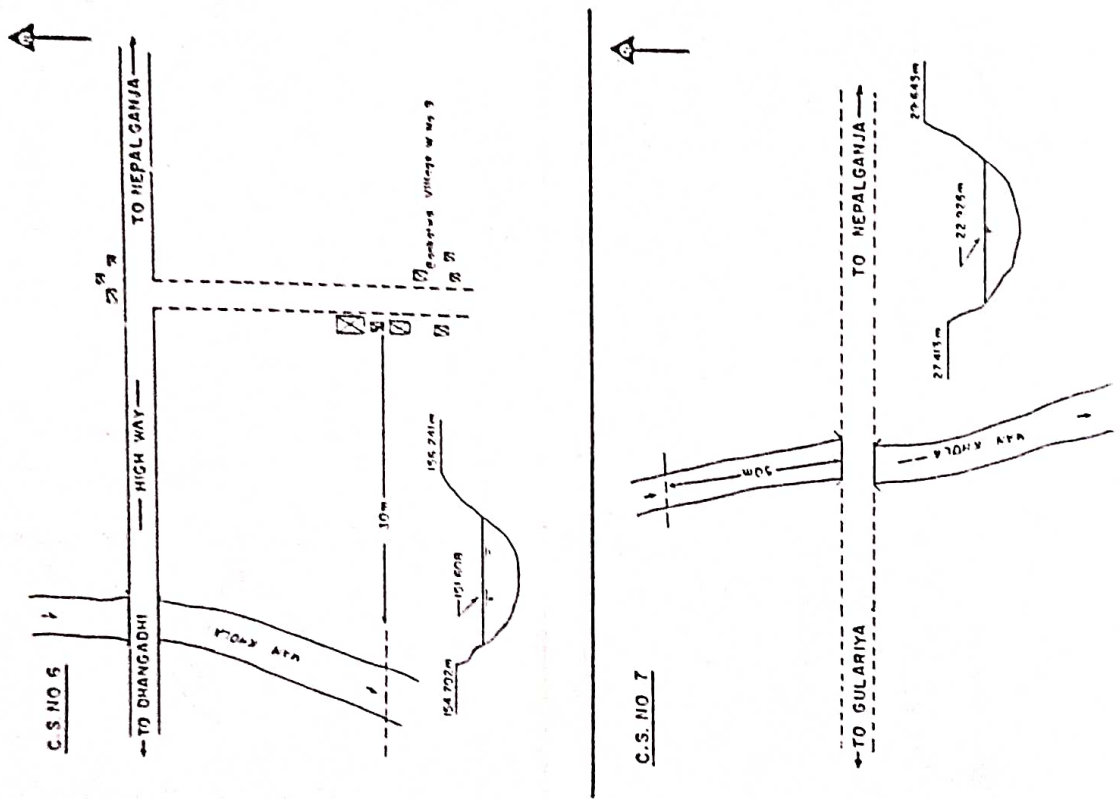


Figure 75.--Sketches of wells 6 - 7 in Bardiya District.

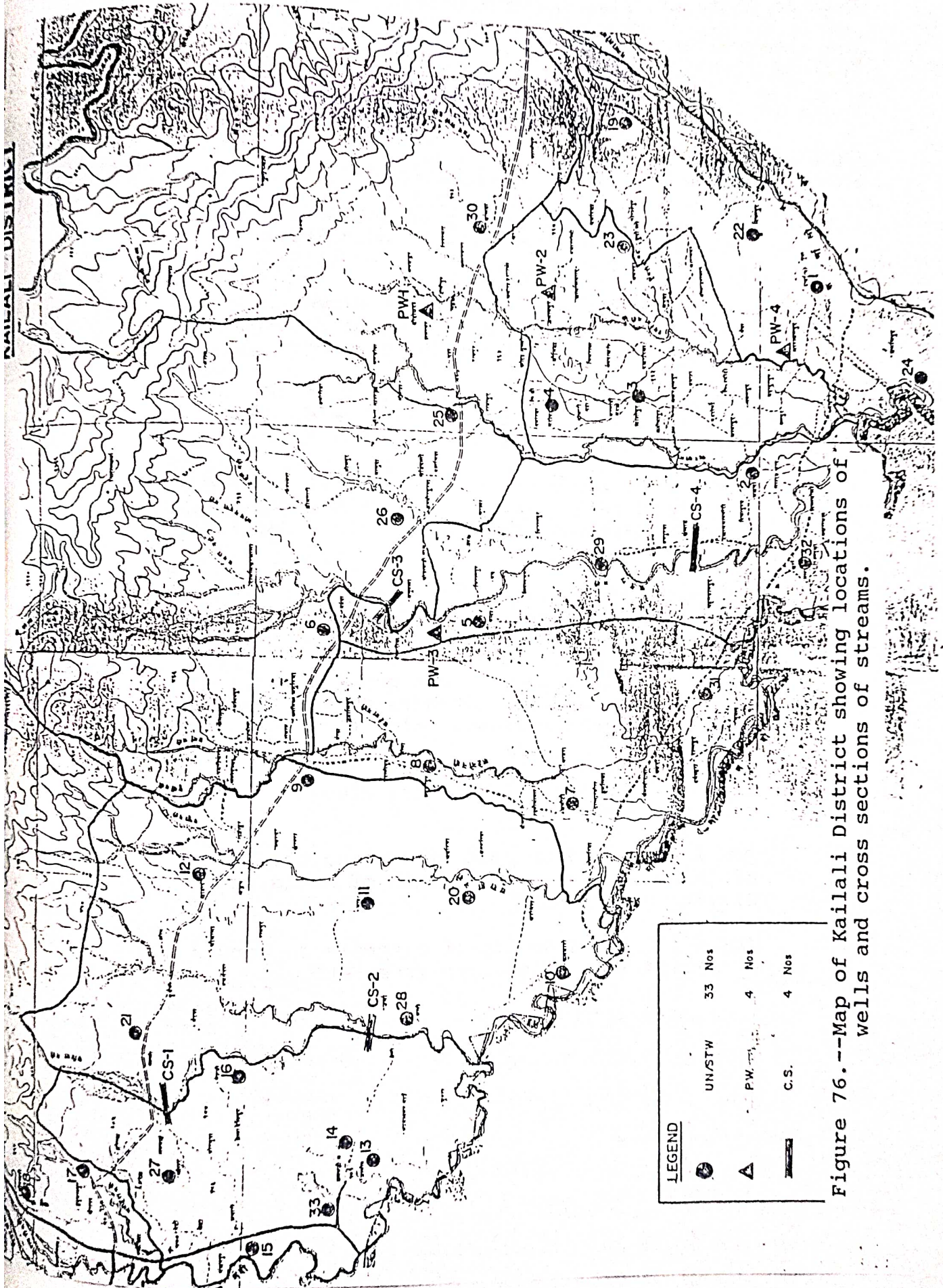


Figure 76.--Map of Kailali District showing locations of wells and cross sections of streams.

Kailali District

The location and description of the temporary bench marks used in Kailali District are provided in Table 10.

Table 10.--Bench marks used in Kailali District.

<u>Serial Number</u>	<u>Location and Description of Bench Marks</u>	<u>Elevation</u>
1	TBM was fixed on the top of south western pillar of the bridge over Kandra Khola. Elevation from KMHP.	55.745
2	TBM # 75 is a concrete pillar fixed on south west of the Pahalmanpur Chowk on Mahendra Highway. Elevation written on top of pillar.	55.530
3	TBM # 10 fixed on south east end of the culvert over Haraiya canal on the north side of Mahendra Highway. Elevation from KMHP.	87.762
4	TBM # 59/1 was fixed on the root of a Tikuli tree by a nail. Located on north side of Mahendra Highway near Lekma Khola. Elevation from KMHP.	65.747
5	TBM # 40/1 was fixed on the root of a tree south west of the Chaumala Chowk on Mahendra Highway. Elevation from KMHP.	75.695
6	TBM # 130 fixed by a wooden peg with nail on top on north side of Mahendra Highway near cross road to Katache village. Elevation from KMHP.	75.324
7	TBM fixed on a culvert over Banbheda Khola at Station 60+986 of Mahendra Highway. Elevation from KMHP.	91.148
8	TBM # 103 fixed on root of a mango tree north of Mahendra Highway and south of Mutha Bazaar. Elevation from KMHP.	53.703
9	TBM # 105 fixed on top of a temple in Ward # 2 of Baliya VDC. Elevation from KMHP.	57.446

Land surface altitudes at 37 wells and the water surface altitudes at 4 stream cross sections were determined in Kailali District. There were 33 UN wells, 2 private wells, 2 dug wells and 4 stream cross sections surveyed. Locations are shown on the district map, Figure 76; altitudes are listed in Table 11; sketches of the wells and cross sections are shown in Figures 77 - 87.

Table 11.--Well number, village or stream name, ward number, and altitude of land surface at the well or water surface in the stream in meters above sea level in Kailali District.

<u>Well Number</u>	<u>Village or Stream Name</u>	<u>Ward Number</u>	<u>Altitude of Land or Stream Surface</u>
UN 1	Vishnu Kantipur	2	32.3
UN 2	Dhusi	7	31.8
UN 3	Joshipur	7	38.1
UN 4	Simri	2	44.8
UN 5	Kota	7	45.8
UN 6	Thebai	1	58.6
UN 7	Basauti	3	51.7
UN 8	Prithvipur	3	52.3
UN 9	Udasipur	1	61.5
UN 10	Phulabari	3	51.1
UN 11	Bhada	8	62.0
UN 12	Maghi	3	77.4
UN 13	Dhangadhi Village	8	61.2
UN 14	Dhangadhi	1	62.9
UN 15	Rajpur	9	68.8
UN 16	Dhanchauri	1	68.3
UN 17	Lalpur	4	86.1
UN 18	Teghari	8	96.1
UN 19	Katachhe	8	64.9
UN 20	Khairati	2	54.5
UN 21	Banbheda	8	88.0
UN 22	Tikapur	9	44.2
UN 23	Durgauli	1	43.6
UN 24	Chaugurdi	9	29.0
UN 25	Nimuabojhi	2	54.4
UN 26	Simthali	7	55.0
UN 27	Sripur	8	78.5
UN 28	Kanari	3	56.9
UN 29	Bijuliya	2	41.1
UN 30	Baliya	5	58.9

Table 11.--Continued.

<u>Well Number</u>	<u>Village or Stream Name</u>	<u>Ward Number</u>	<u>Altitude of Land or Stream Surface</u>
UN 31	Rampur	7	36.8
UN 32	Lalbojhi	5	30.2
UN 33	Dhangadhi	4	63.6
PW 1	Dodhara	3	53.3
PW 3	Ambasa	5	52.0
DG 2	Pratappur	2	45.8
DG 4	Narayanpur	4	33.3
CS 1	Khutiya Nadi		76.9
CS 2	Khutiya Nadi		87.8
CS 3	Kandra Nadi		49.3
CS 4	Kandra Nadi		31.5

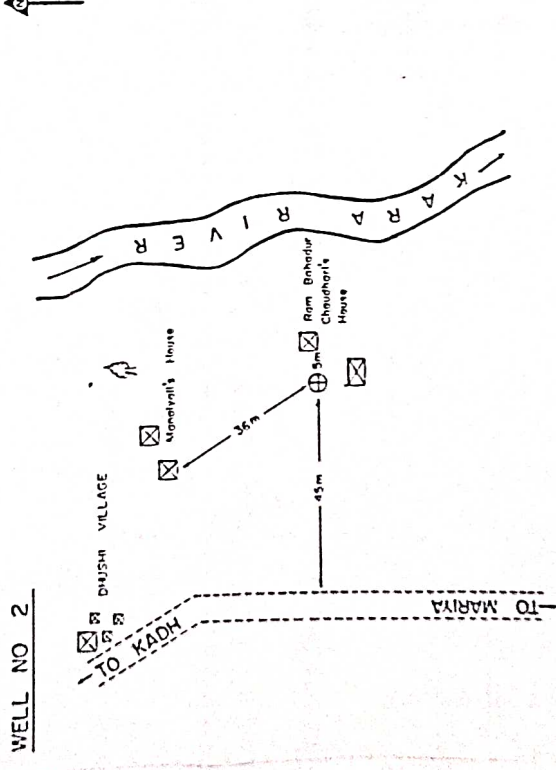
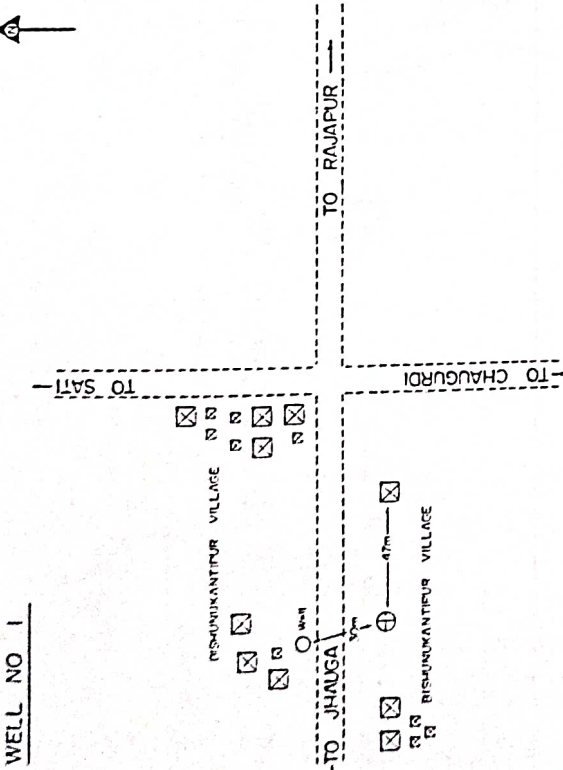
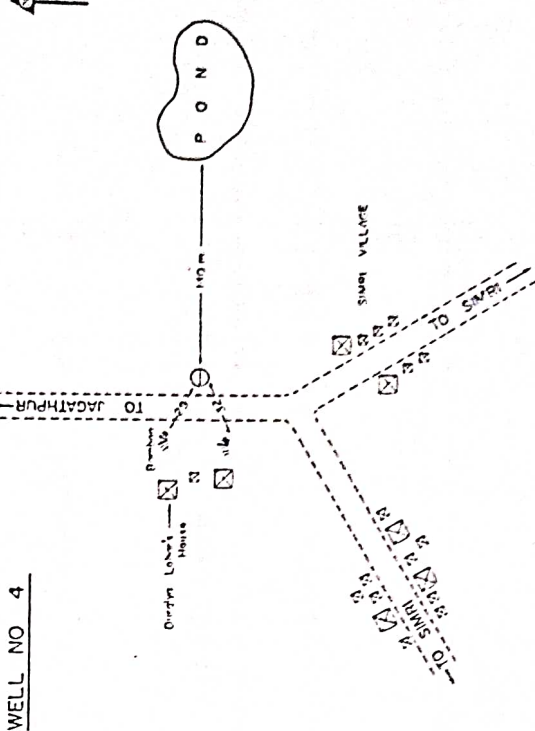
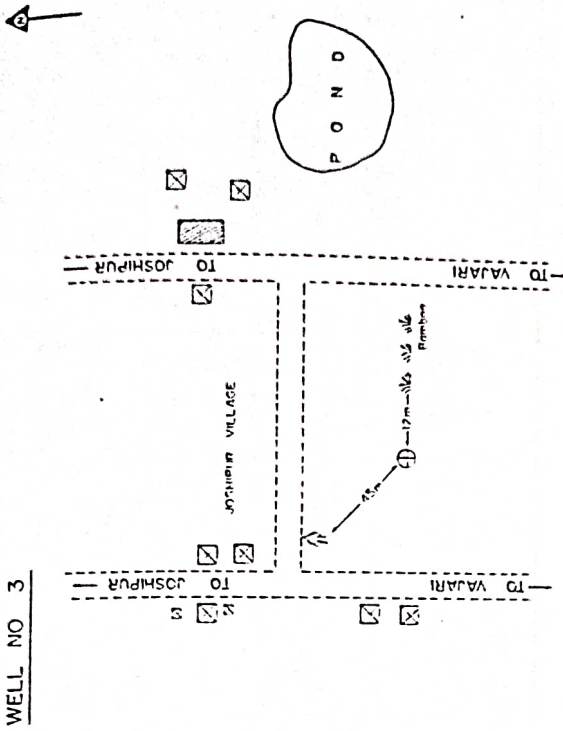
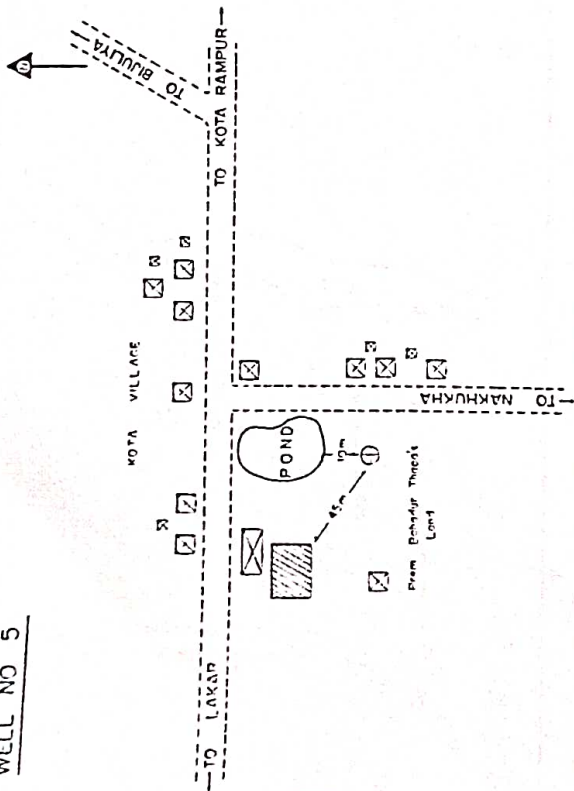
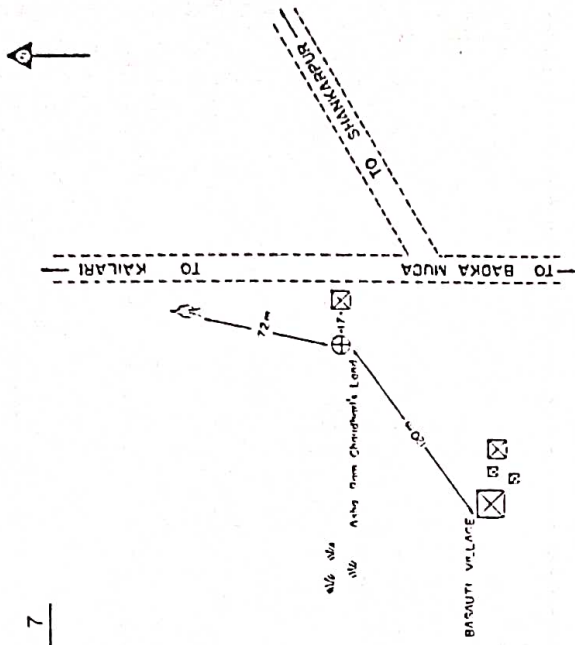


Figure 77.--Sketches of wells 1 - 4 in Kailali District.

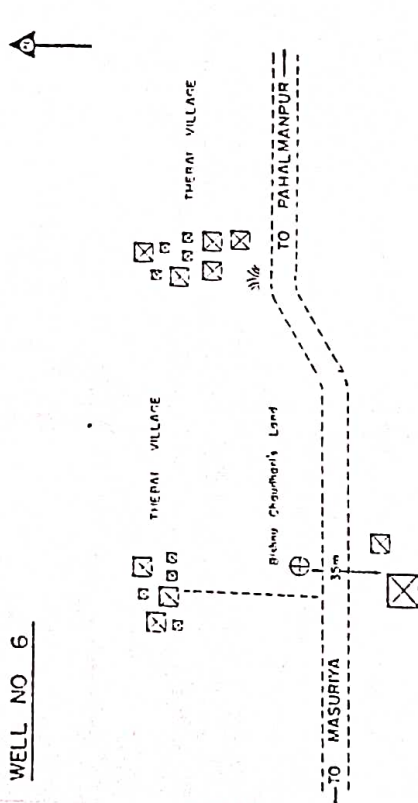
WELL NO 5



WELL NO 7



WELL NO 6



WELL NO 8

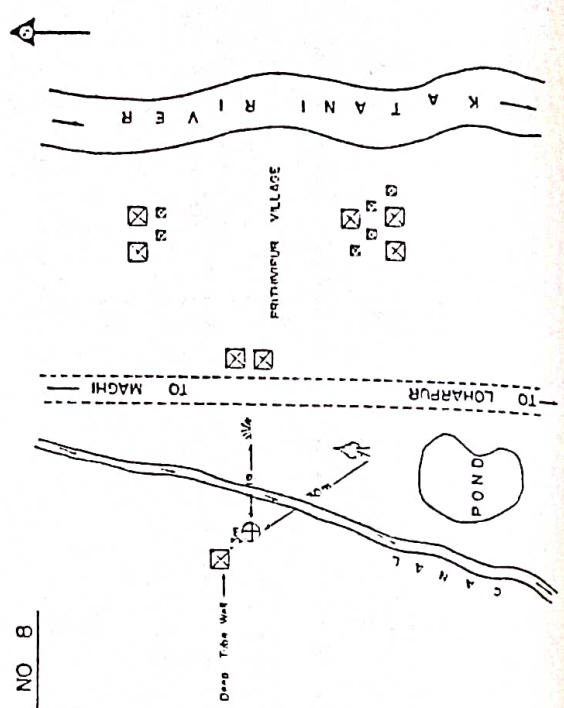


Figure 78.--Sketches of wells 5 - 8 in Kailali District.

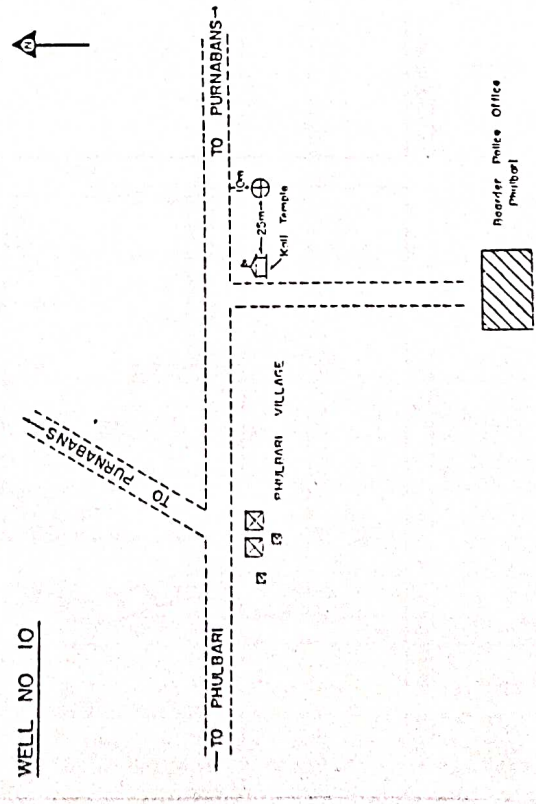
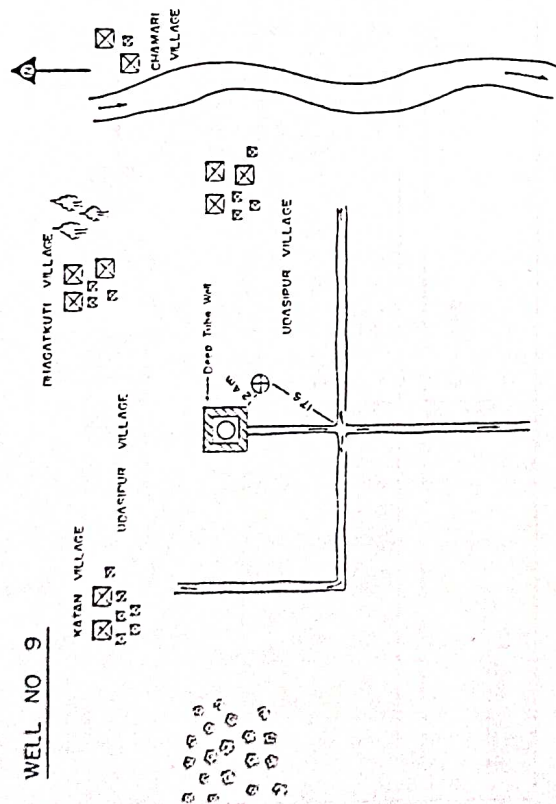
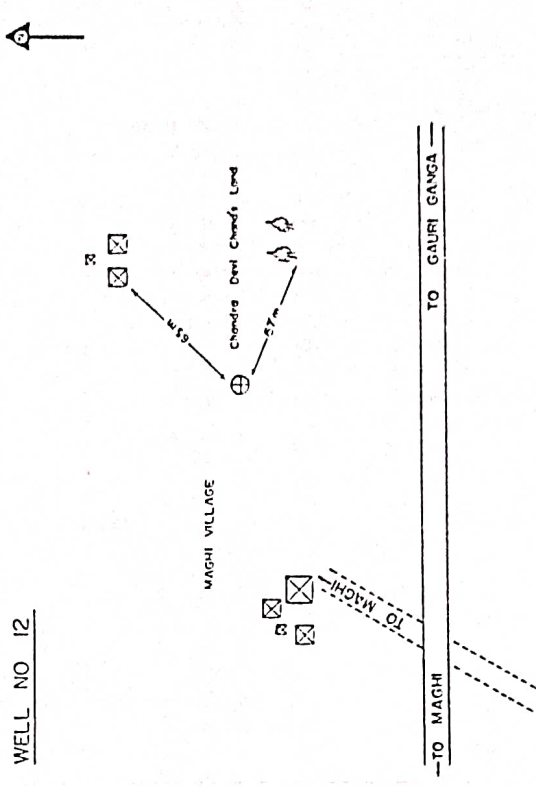
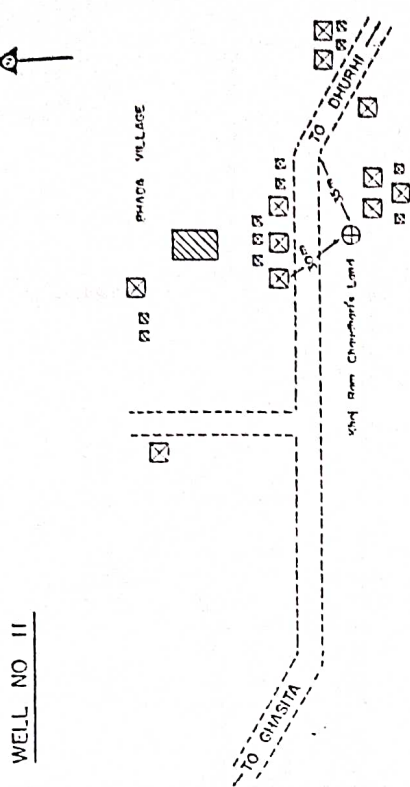


Figure 79.--Sketches of wells 9 - 12 in Kailali District.

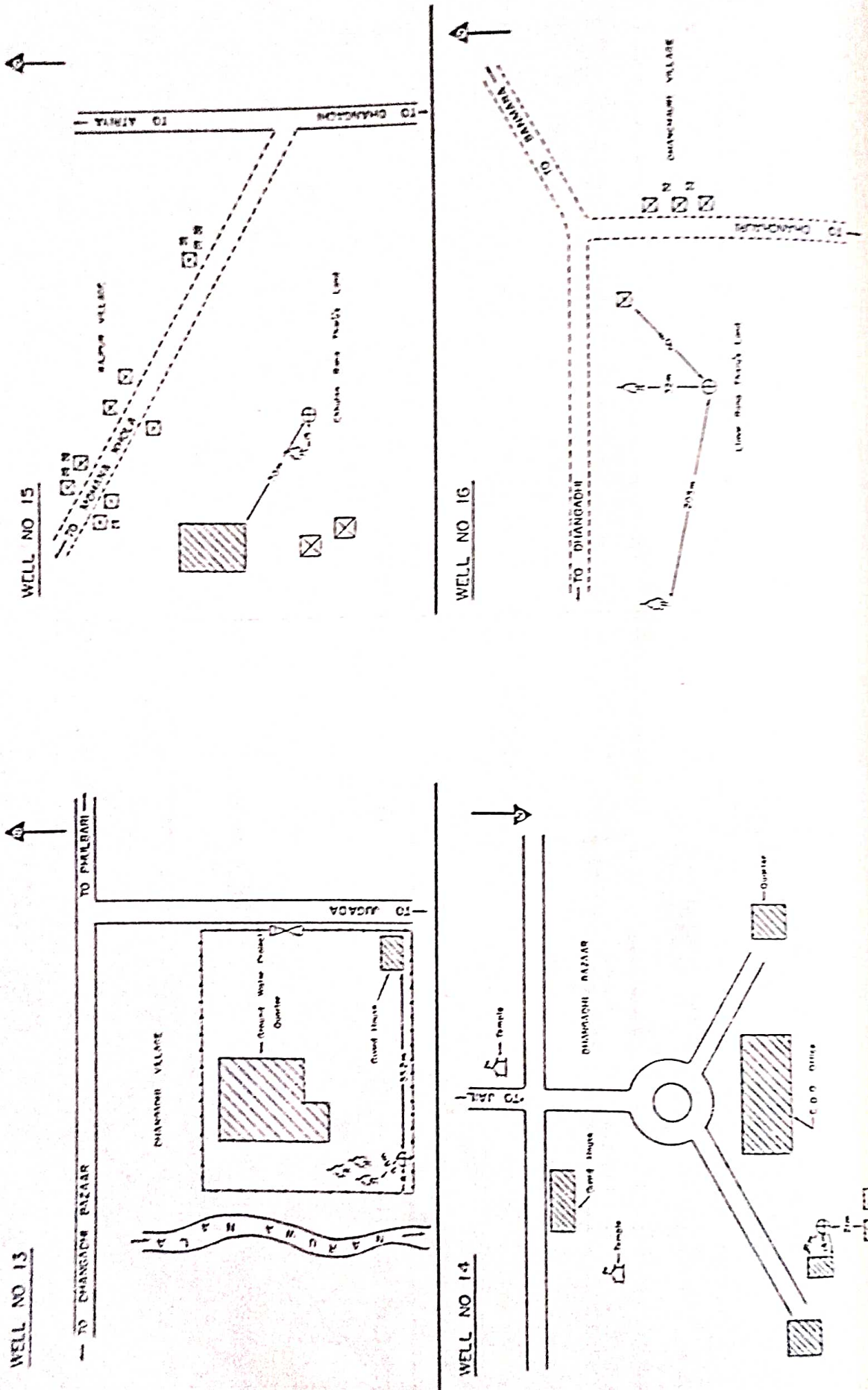


Figure 80.--Sketches of wells 13 - 16 in Kailali District.

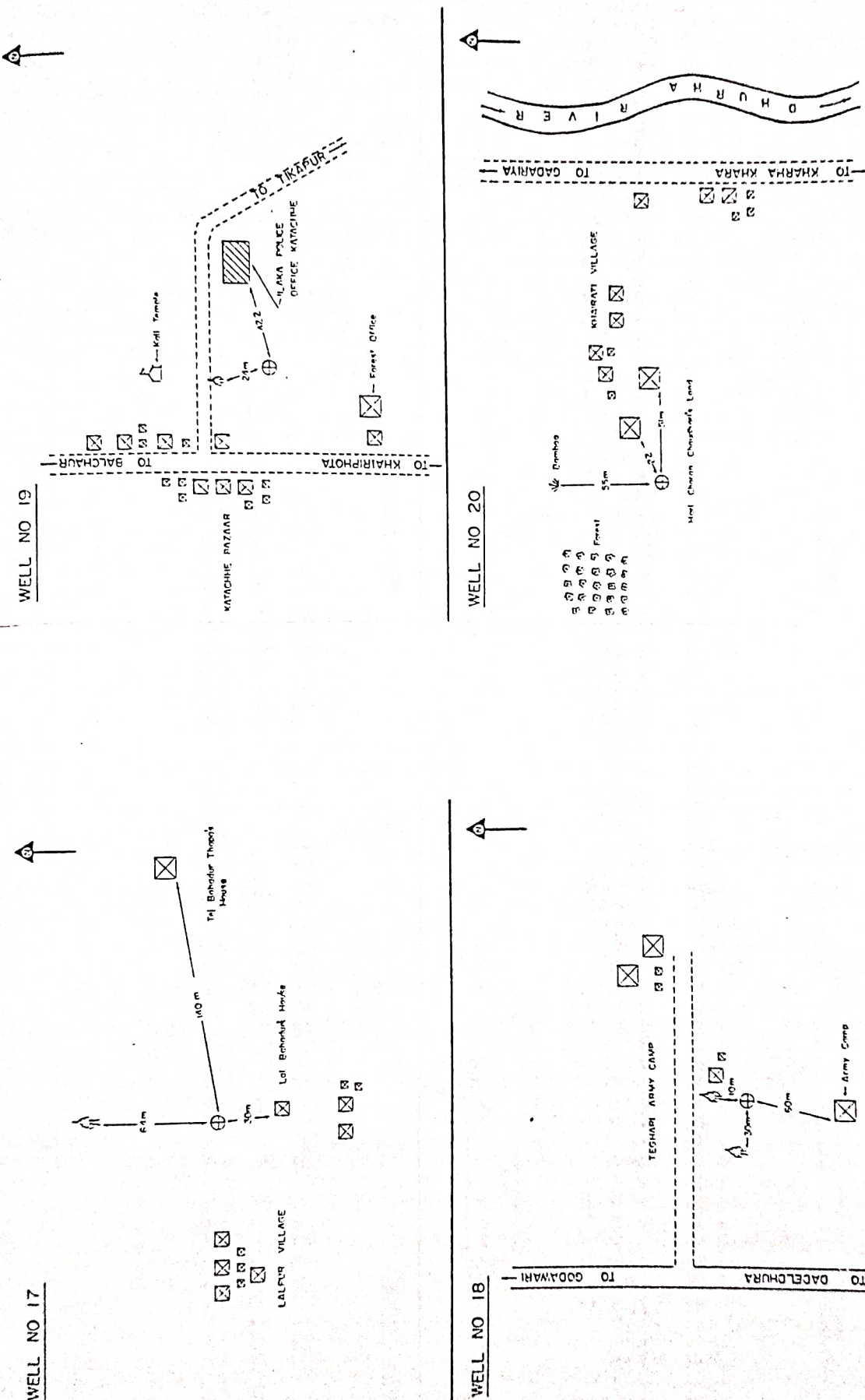


Figure 81.--Sketches of wells 17 - 20 in Kailali District.

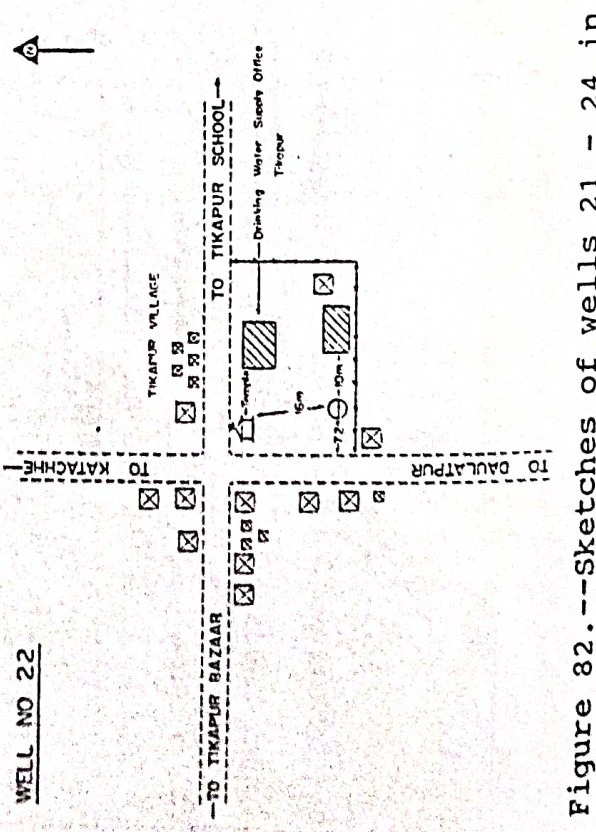
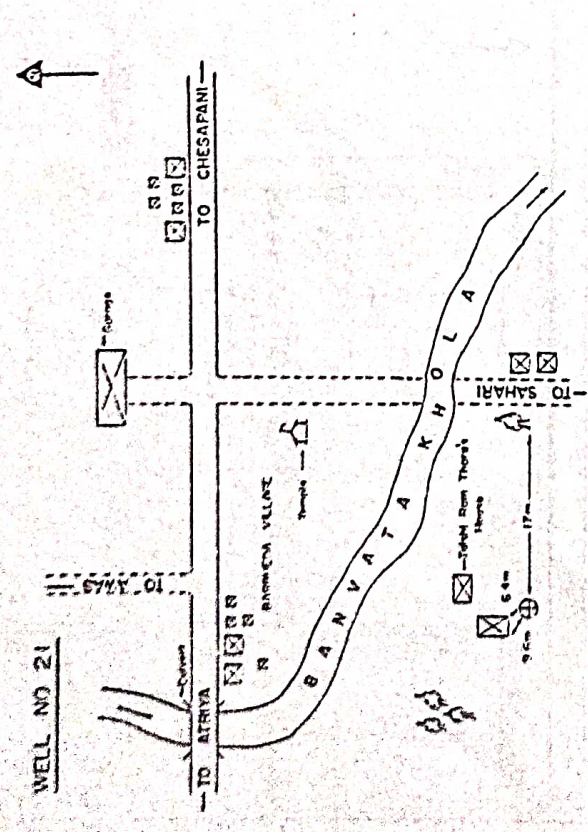
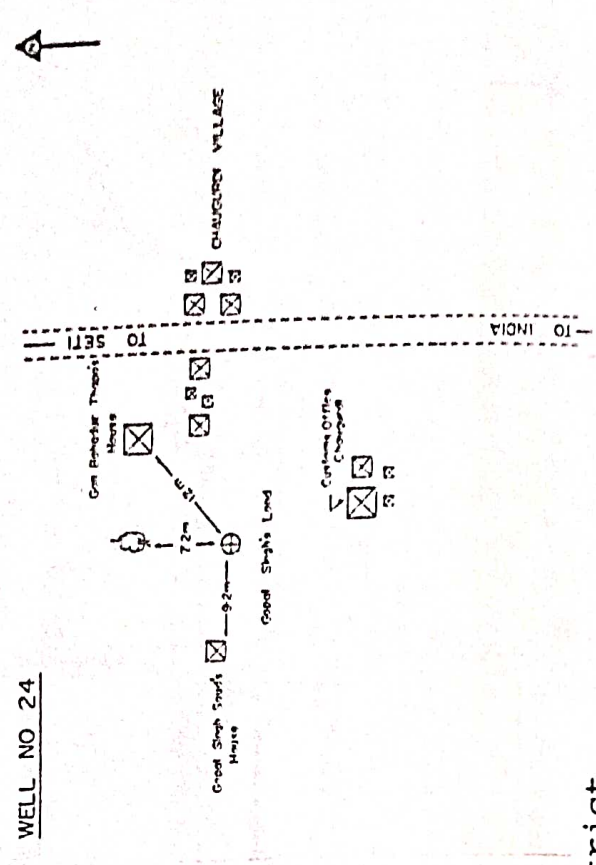
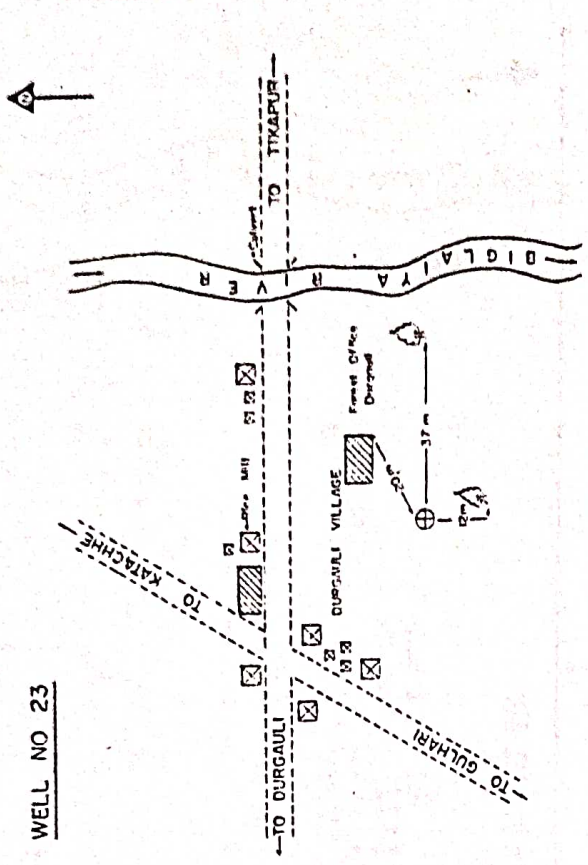


Figure 82.--Sketches of wells 21 - 24 in Kailali District.

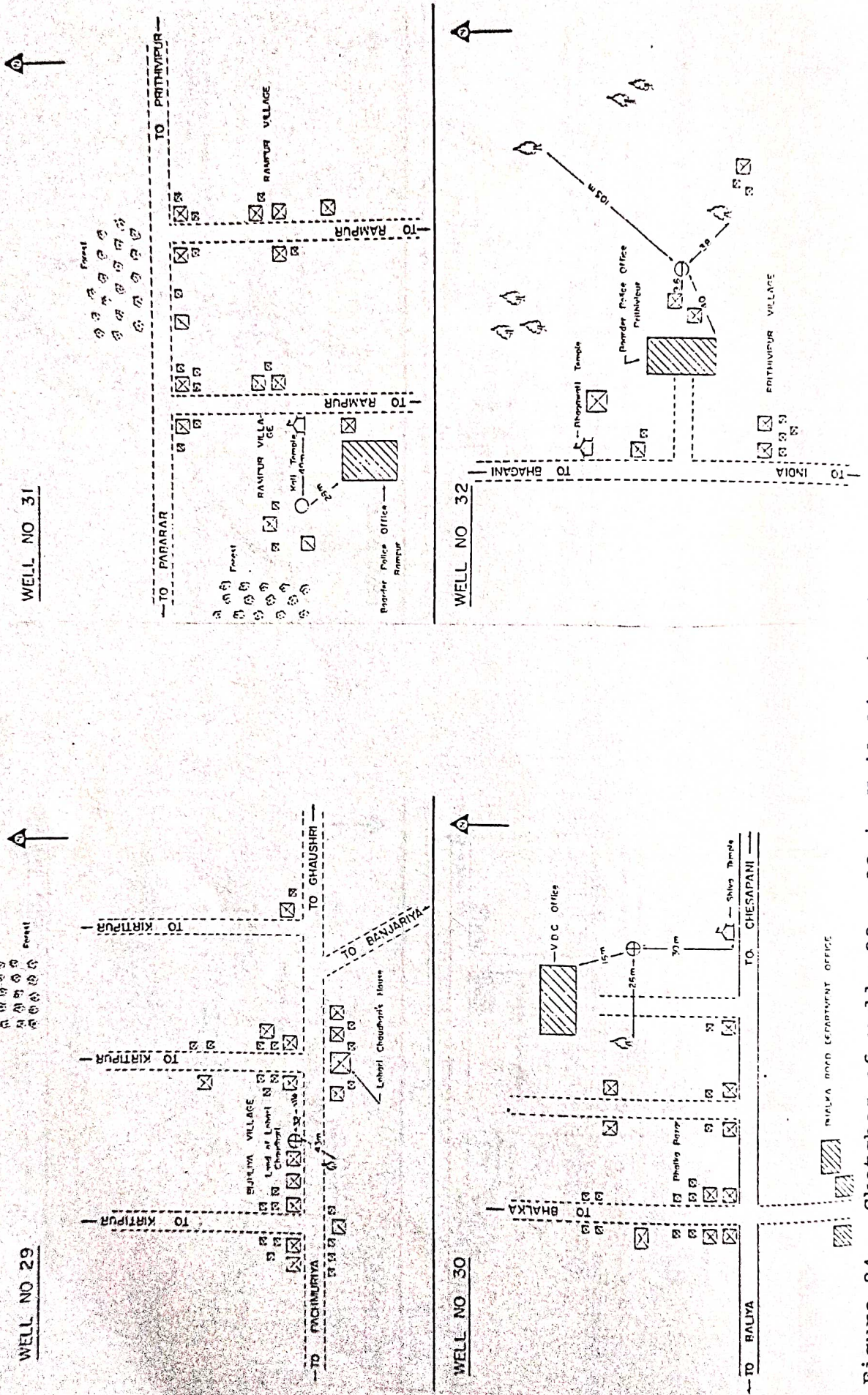


Figure 84.--Sketches of wells 29 - 32 in Kailali District.

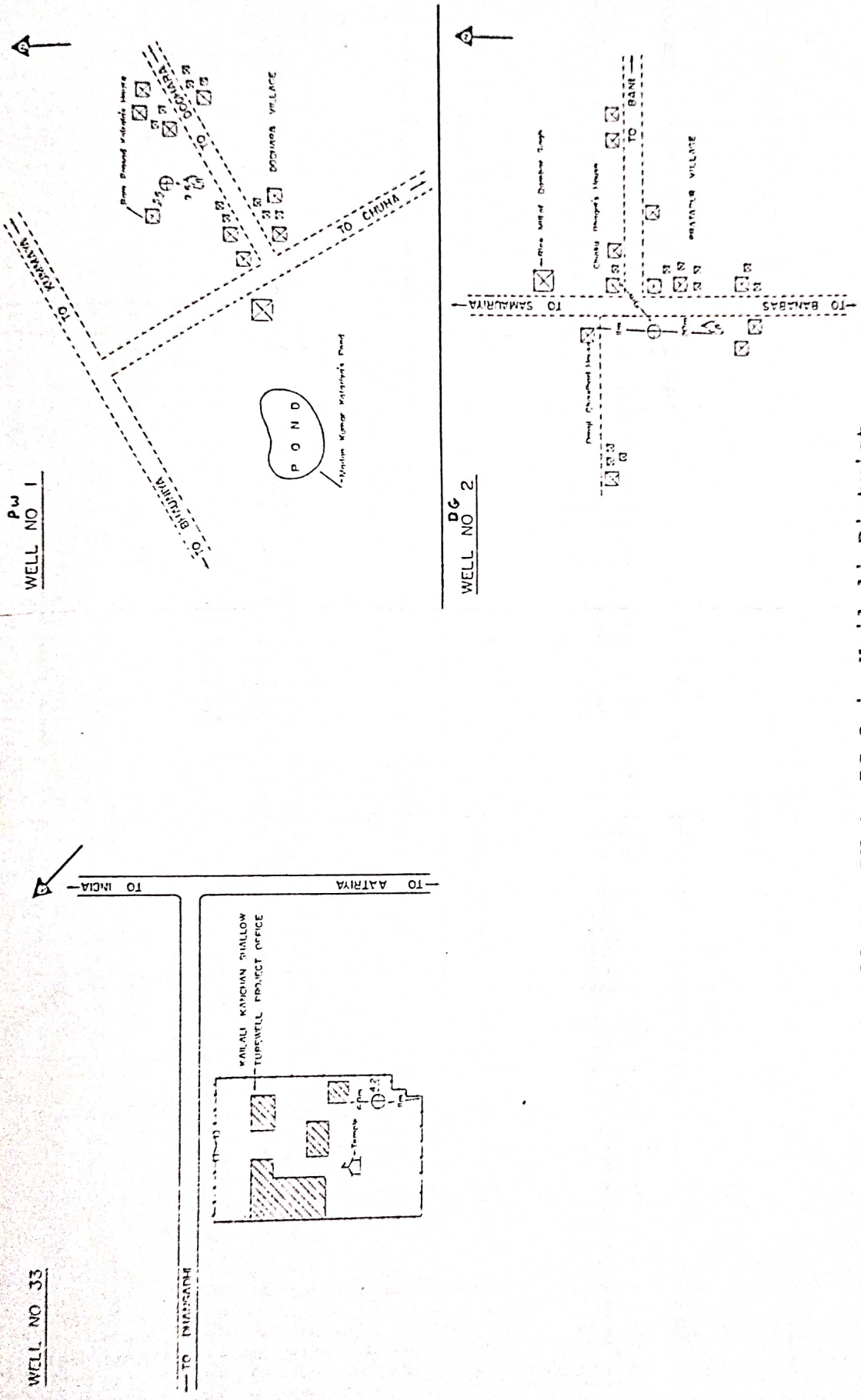
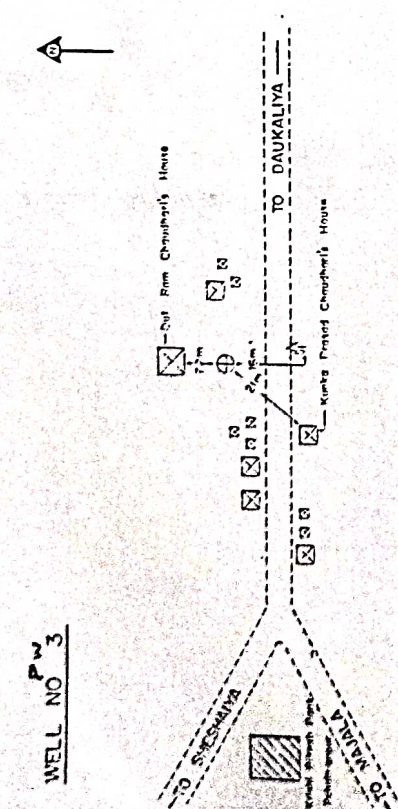
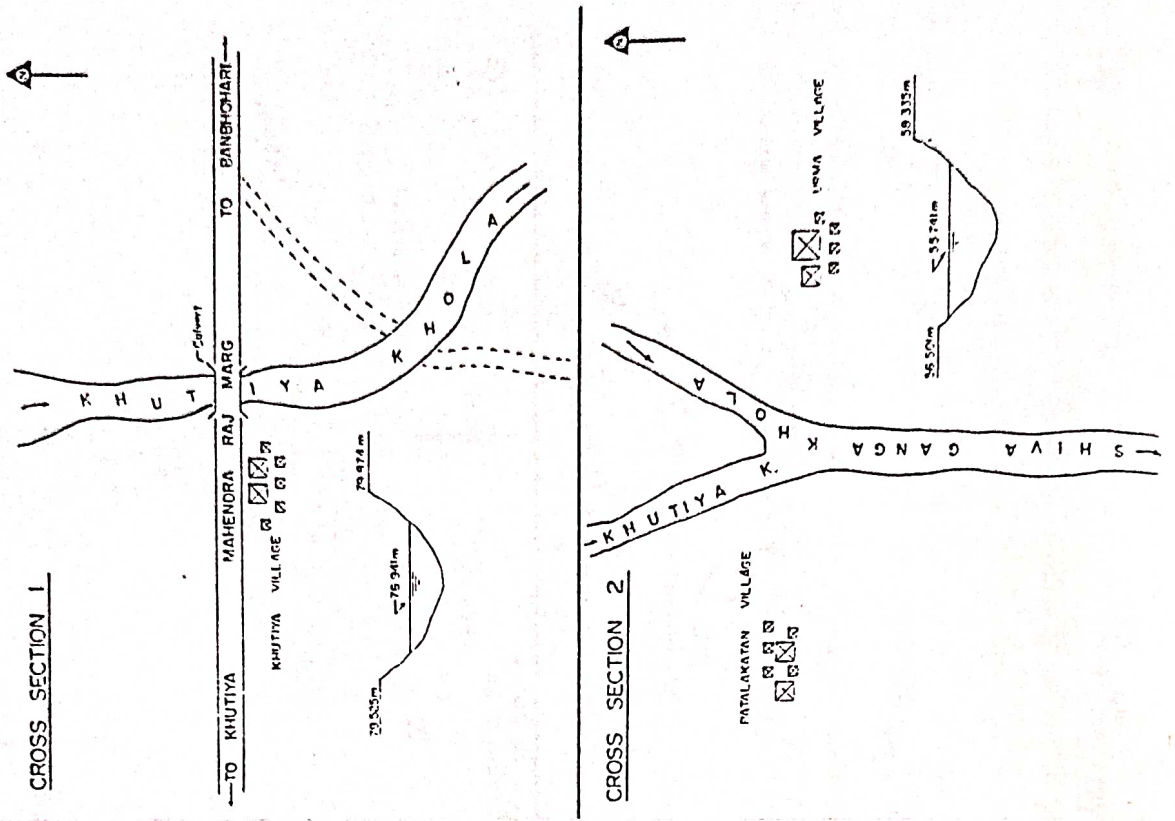
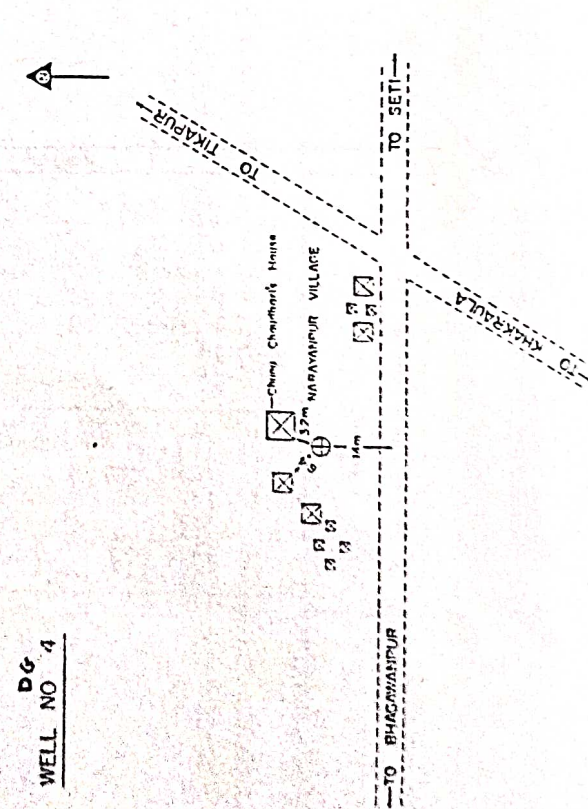


Figure 85.--Sketches of well 33, PW 1, DG 2 in Kailali District.



WELL NO 3



DG NO 4

Figure 86.--Sketches of wells PW 3, DG 4 and sections 1, 2 in Kailali District.

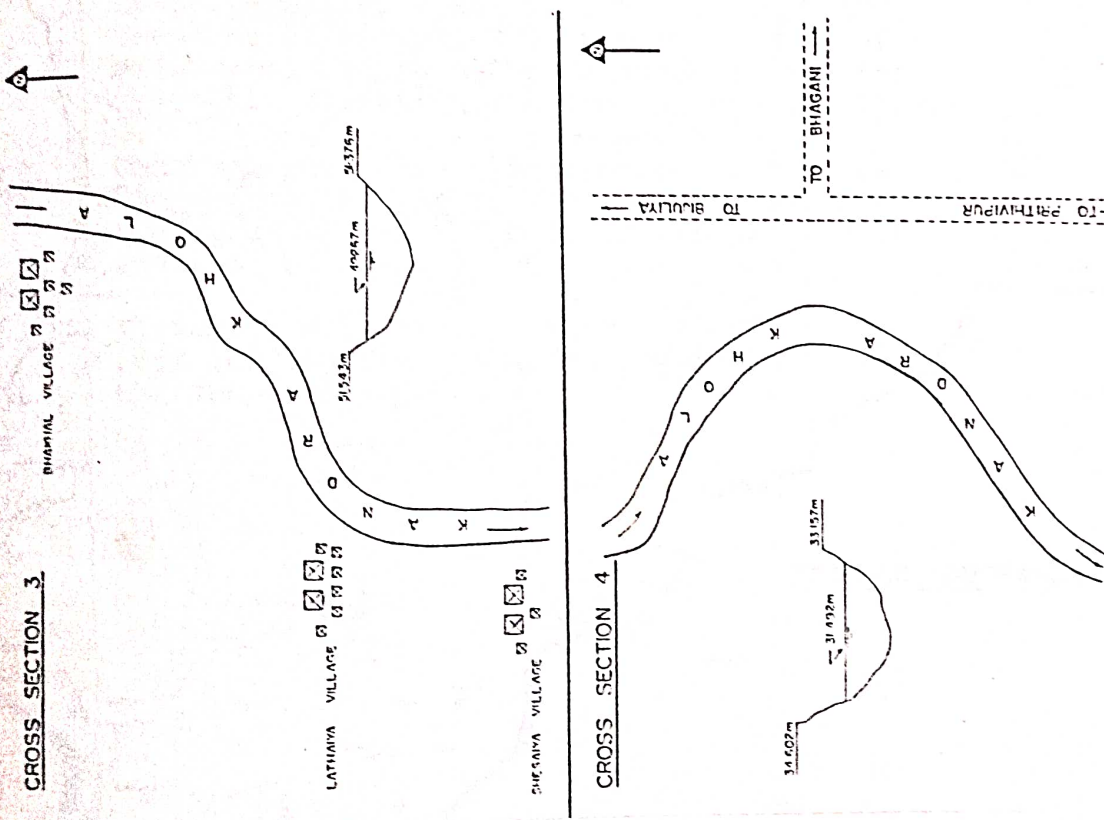


Figure 87.--Sketches of sections 3 - 4 in Kailali District.

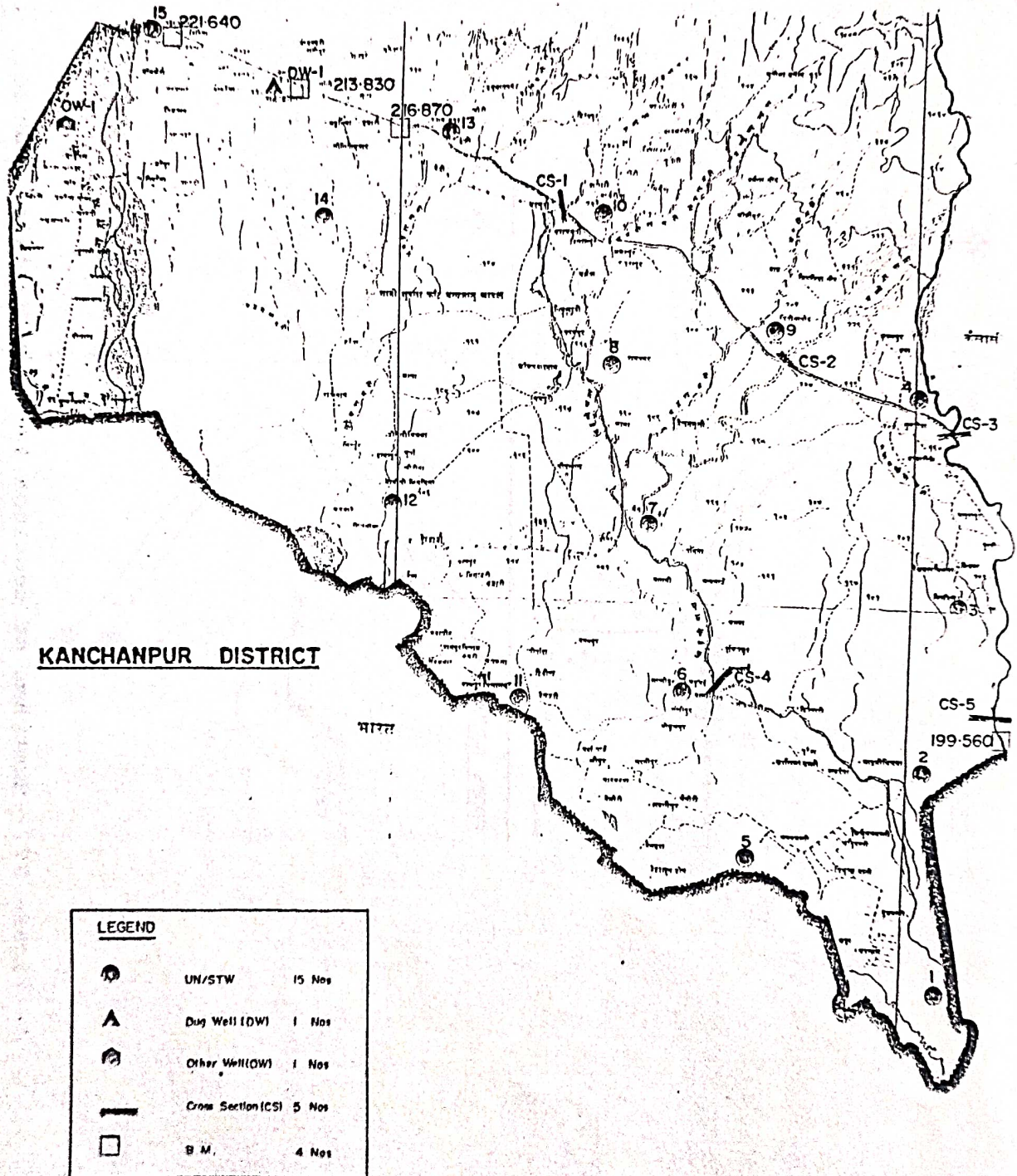


Figure 88.--Map of Kanchanpur District showing locations of wells and cross sections of streams.

Kanchanpur District

The location and description of the temporary benchmarks used in Kanchanpur District are provided in Table 12.

Table 12.--Bench marks used in Kanchanpur District.

<u>Serial Number</u>	<u>Location and Description of Bench Marks</u>	<u>Elevation</u>
1	Cement plastered pillar fixed and located 250 m west of the bridge over Chaundhar River on the south side of the road. Elevation from KMHP.	216.877
2	Concrete pillar fixed and located inside compound of a quarter on the south side of the main canal belonging to Mahakali Irrigation Project. Elevation engraved on top of pillar.	221.640
3	Concrete post fixed and located between two old and new Mohana bridges on the east side of the Mohana River. Elevation painted red on one side of post.	199.560
4	Elevation written on a pipe culvert on the road leading from Mahendra Nagar bazaar to the local jail.	213.830

Land surface altitudes at 17 wells and the water surface altitudes at 2 stream cross sections were determined in Kailali District. There were 15 UN wells, 1 private well, 1 dug well and 5 stream cross sections surveyed. Locations are shown on the district map, Figure 88; altitudes are listed in Table 13; sketches of the wells and cross sections are shown in Figures 89 - 94.

Table 13.--Well number, village or stream name, ward number, and altitude of land surface at the well or water surface in the stream in meters above sea level in Kanchanpur District.

<u>Well Number</u>	<u>Village or Stream Name</u>	<u>Ward Number</u>	<u>Altitude of Land or Stream Surface</u>
UN 1	Kankar	9	184.0
UN 2	Pachkaria	5	190.4
UN 3	Piparia	9	204.6
UN 4	Mauwaphanta	6	213.9
UN 5	Mataia	6	195.6
UN 6	Shantipur	5	201.8
UN 7	Jain	3	208.3
UN 8	Bansa	3	209.8
UN 9	Bani	2	211.2
UN 10	Banjariya	7	213.9
UN 11	Pachui	4	202.3
UN 12	Beldandi	3	203.3
UN 13	Daiji	1	217.8
UN 14	Ultakham	2	204.9
UN 15	Gathachowki	11	220.9
DW 1	Mahendra Nagar	4	212.1
PW 2	Chadni	2	215.0
CS 1	Arjani Nala		212.9
CS 2	Mohana Nadi		210.1
CS 3	Machheli Nala		204.8
CS 4	Sinhali Nala		200.5
CS 5	Mohana Nadi		195.2

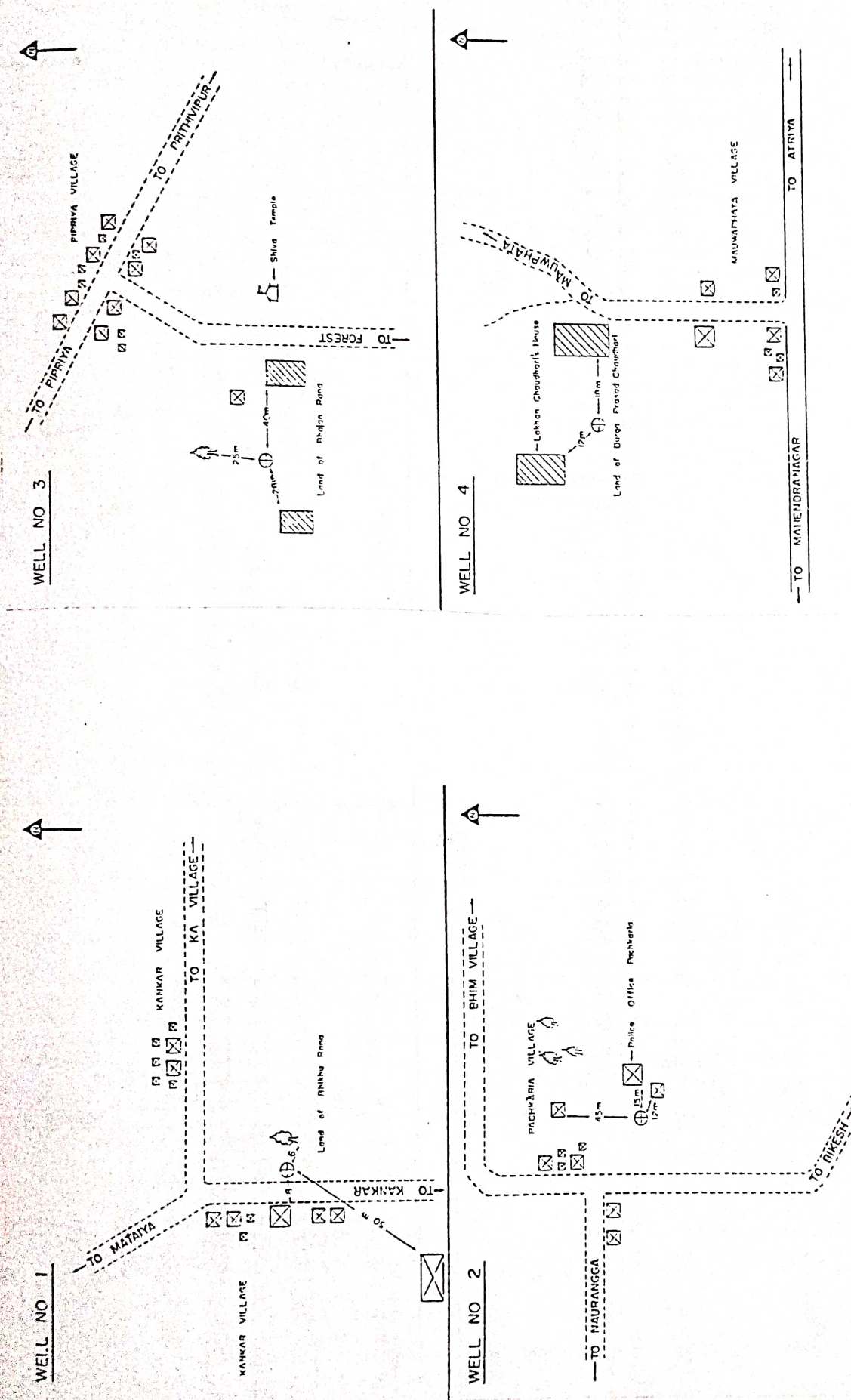


Figure 89.--Sketches of wells 1 - 4 in Kanchanpur District.

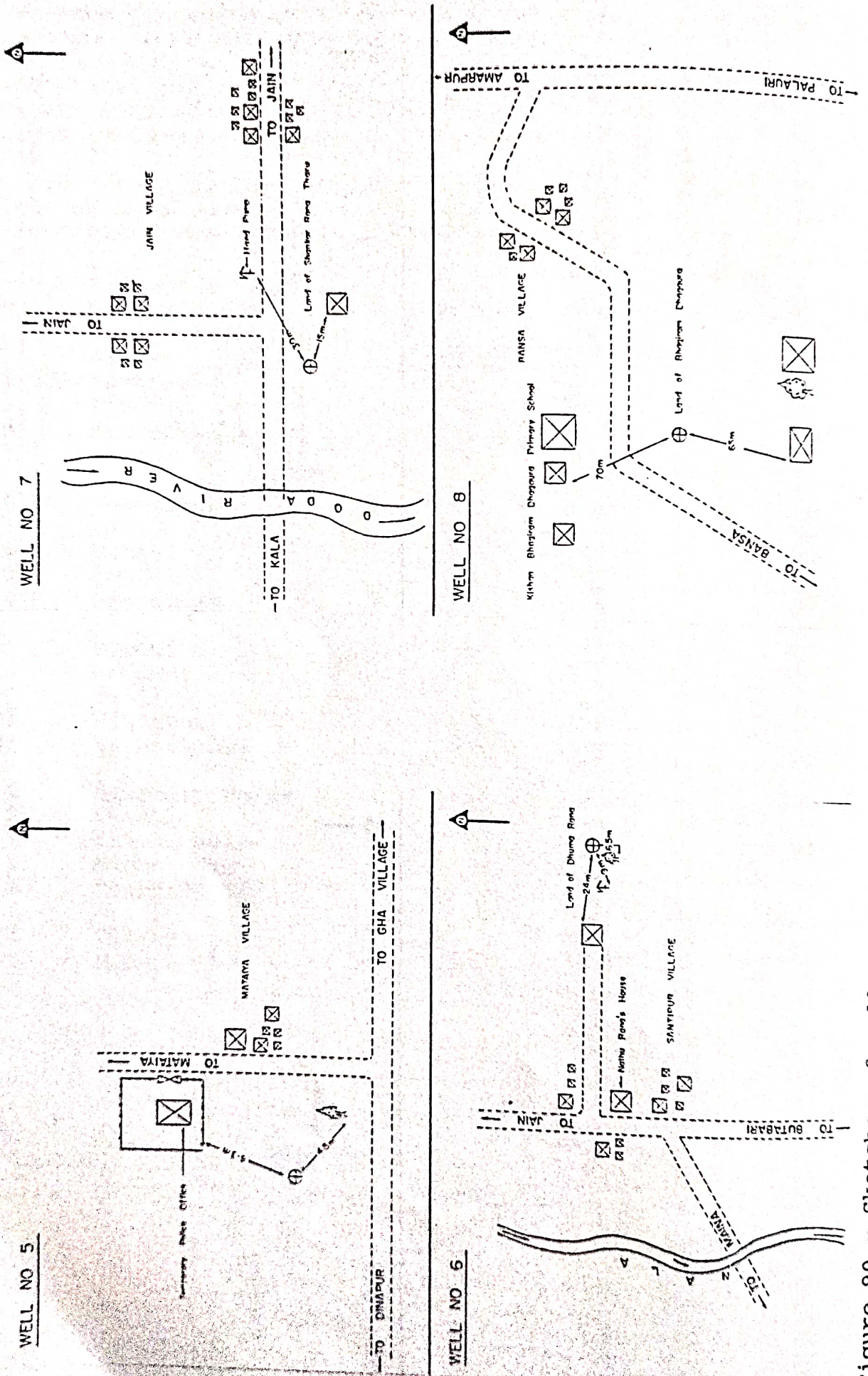


Figure 90.--Sketches of wells 5 - 8 in Kanchanpur District.

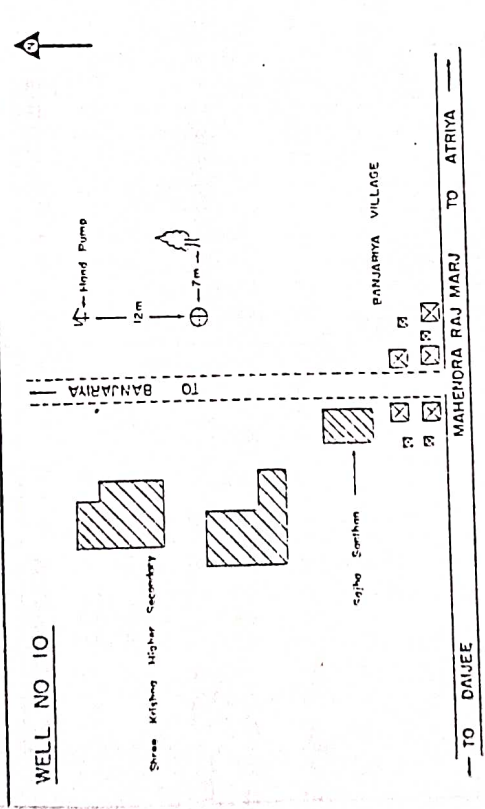
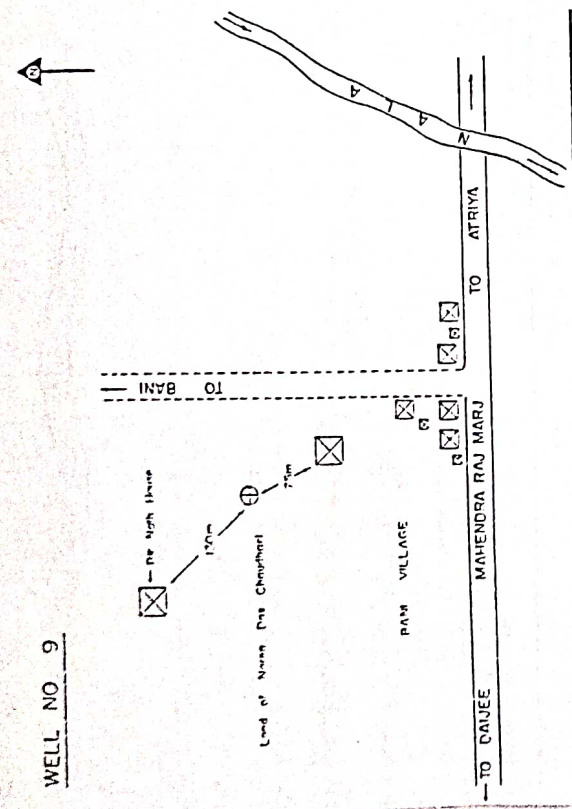
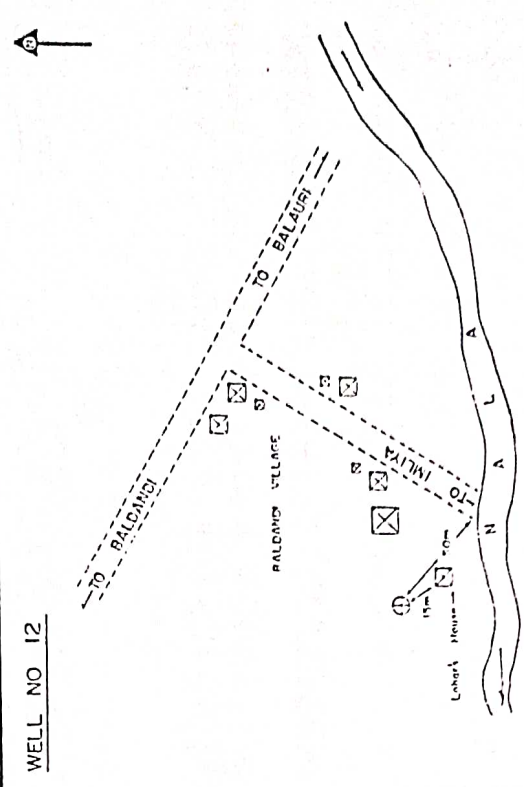
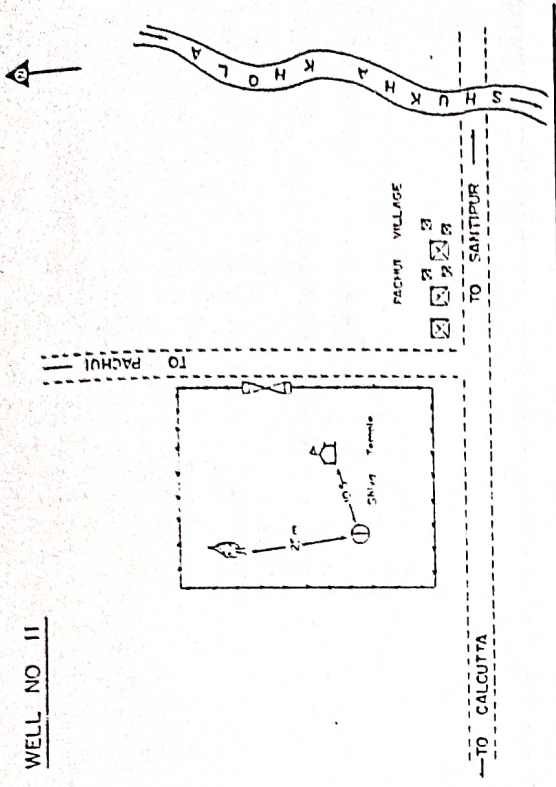


Figure 91.--Sketches of wells 9 - 12 in Kanchanpur District.

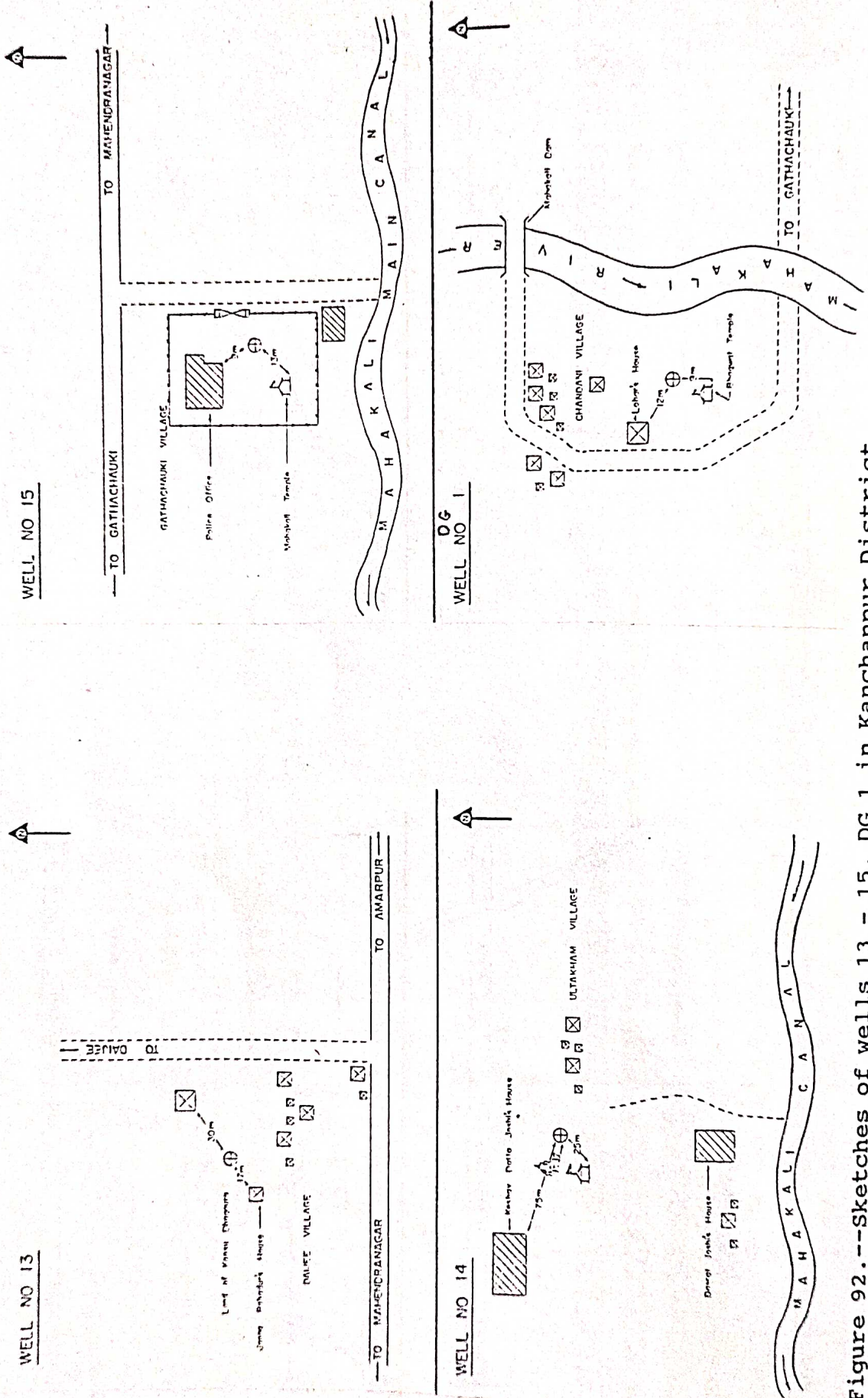


Figure 92.--Sketches of wells 13 - 15, DG 1 in Kanchanpur District.

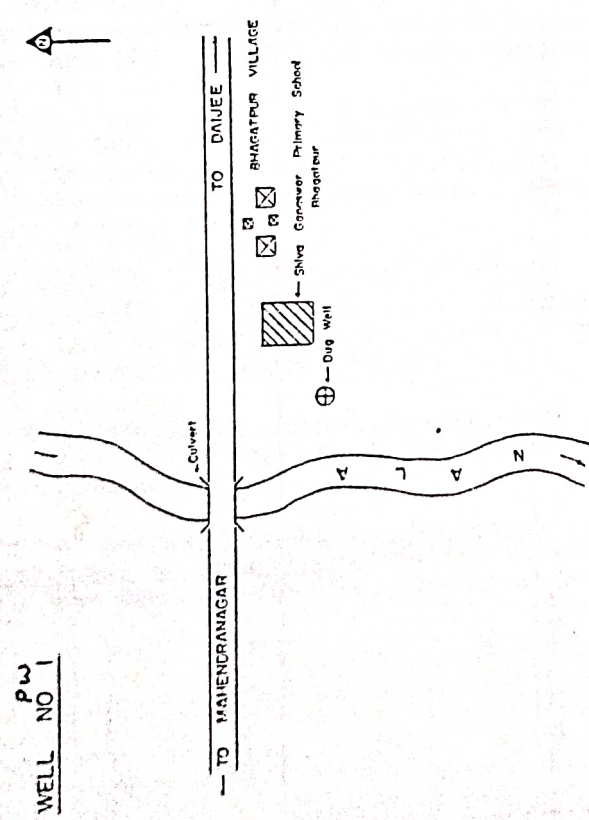
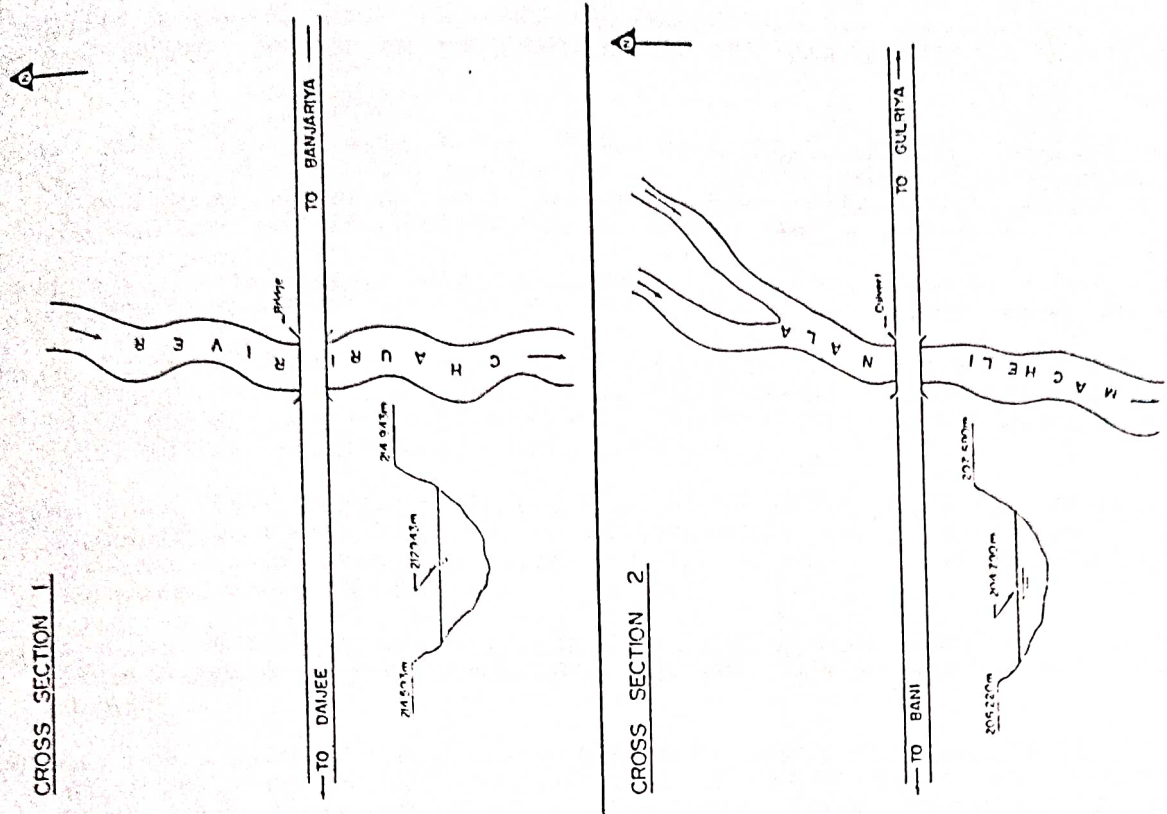


Figure 93.--Sketches of well PW 1 and sections 1, 2 in Kanchanpur District.

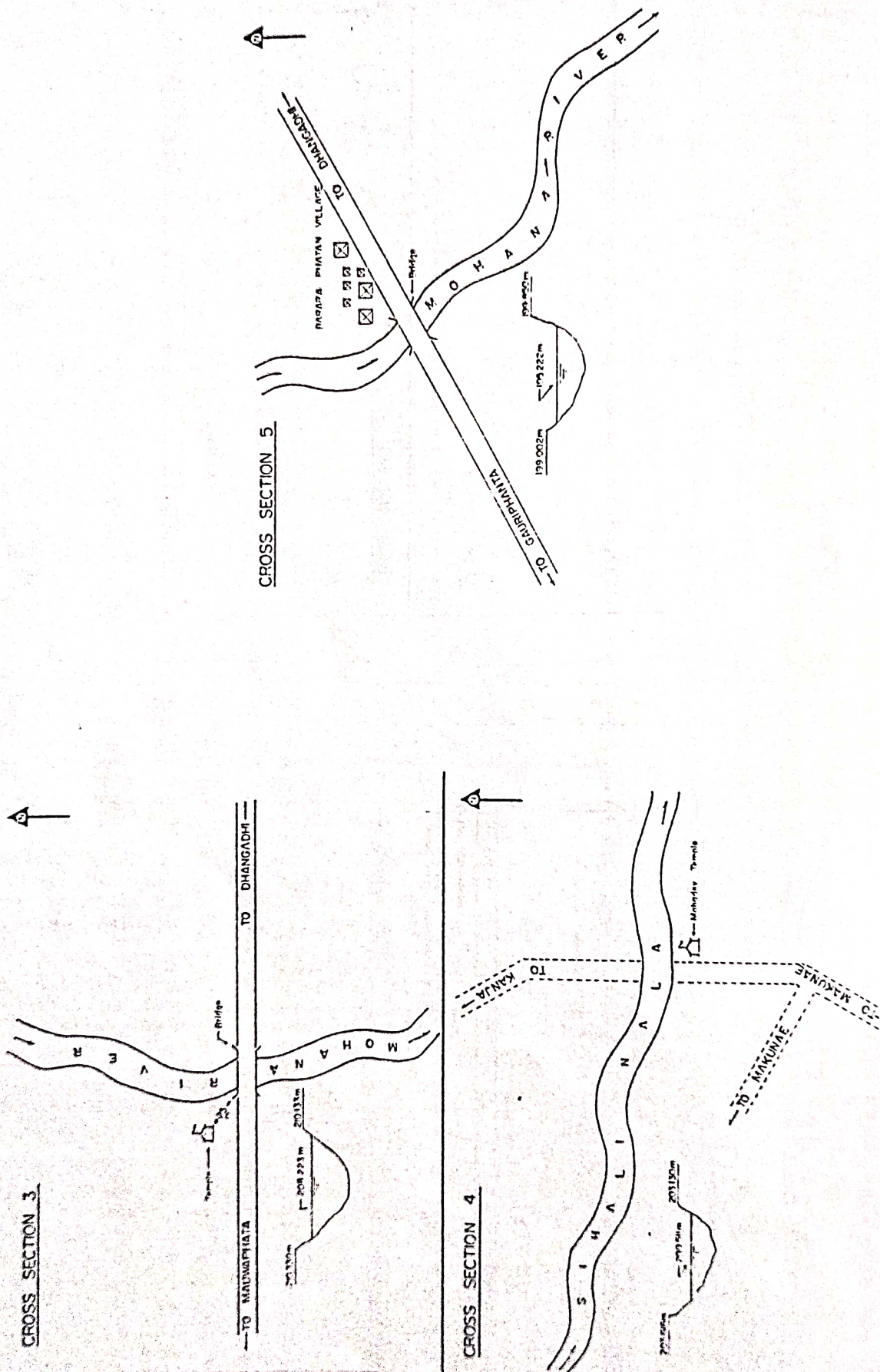


Figure 94.--Sketches of sections 3 - 5 in Kanchanpur District.

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