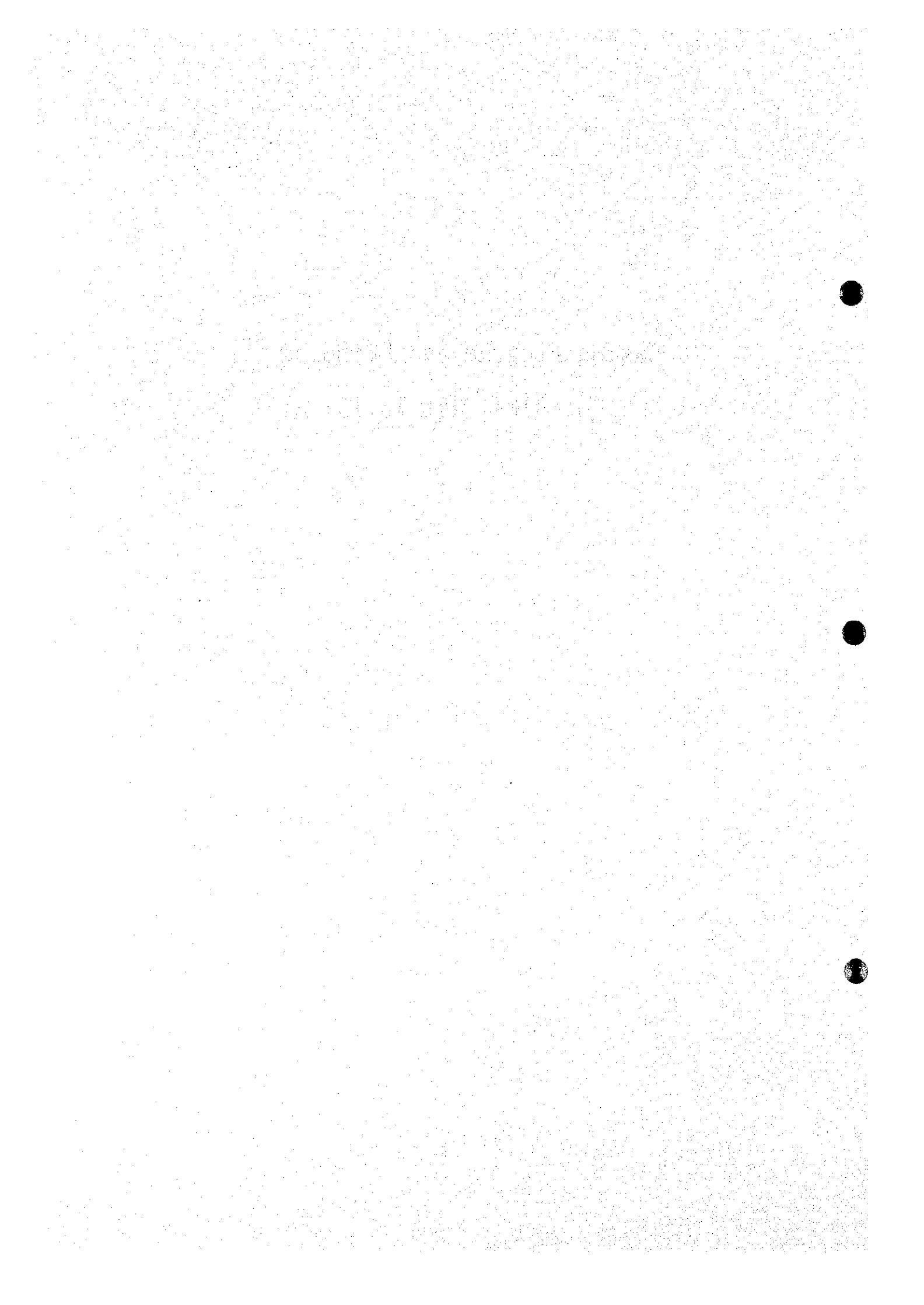


2. TEST DRILLING AND PUMPING TEST

2.1

Casing Program and Lithology
of JICA Test Wells



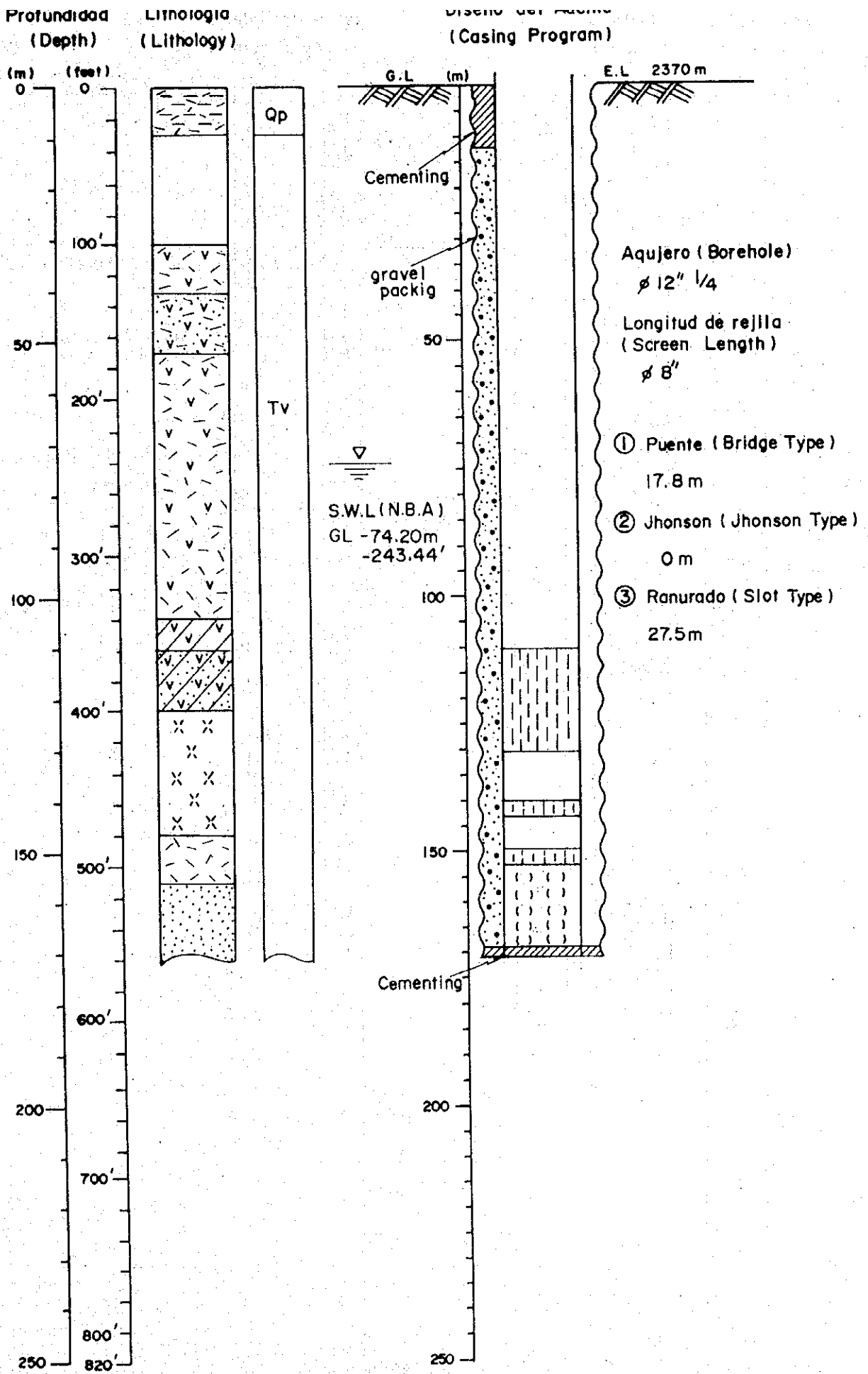


Fig. (Casing Program and Lithology of JICA Test Well Solola)

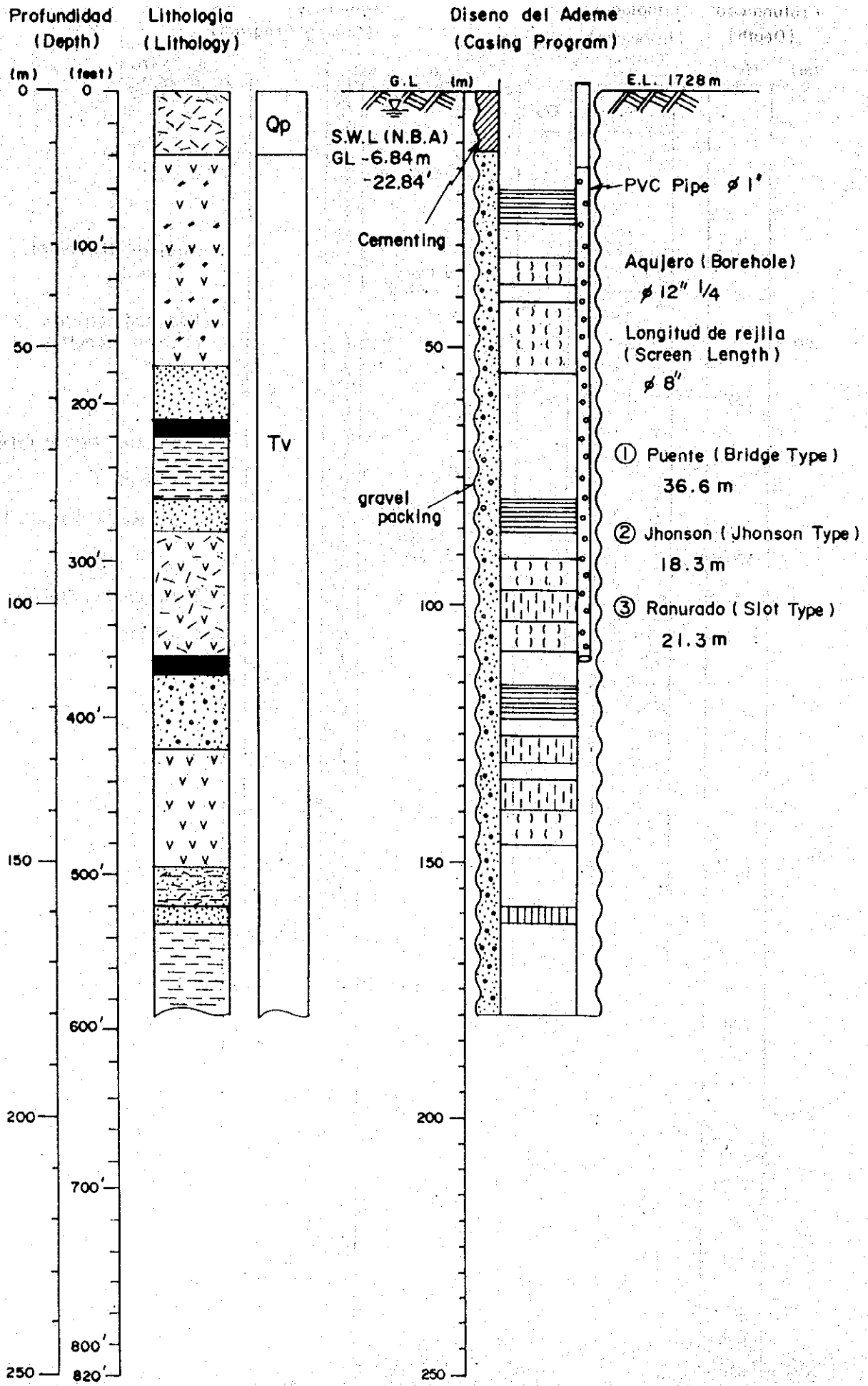


Fig. Casing Program and Lithology of JICA Test Well
(San Jose Pinula)

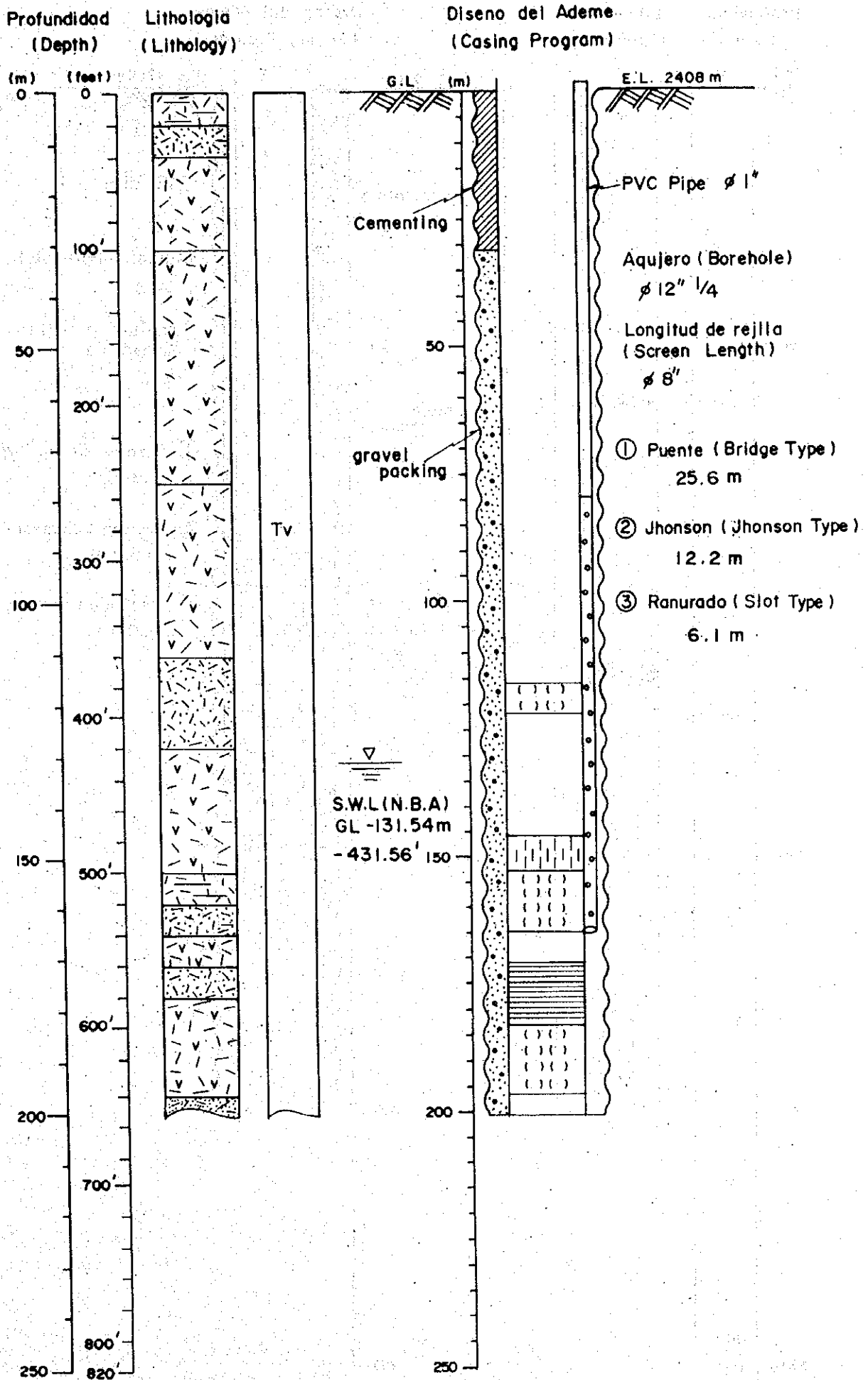


Fig. Casing Program and Lithology of JICA Test Well
(Santa Lucía Utatlan)

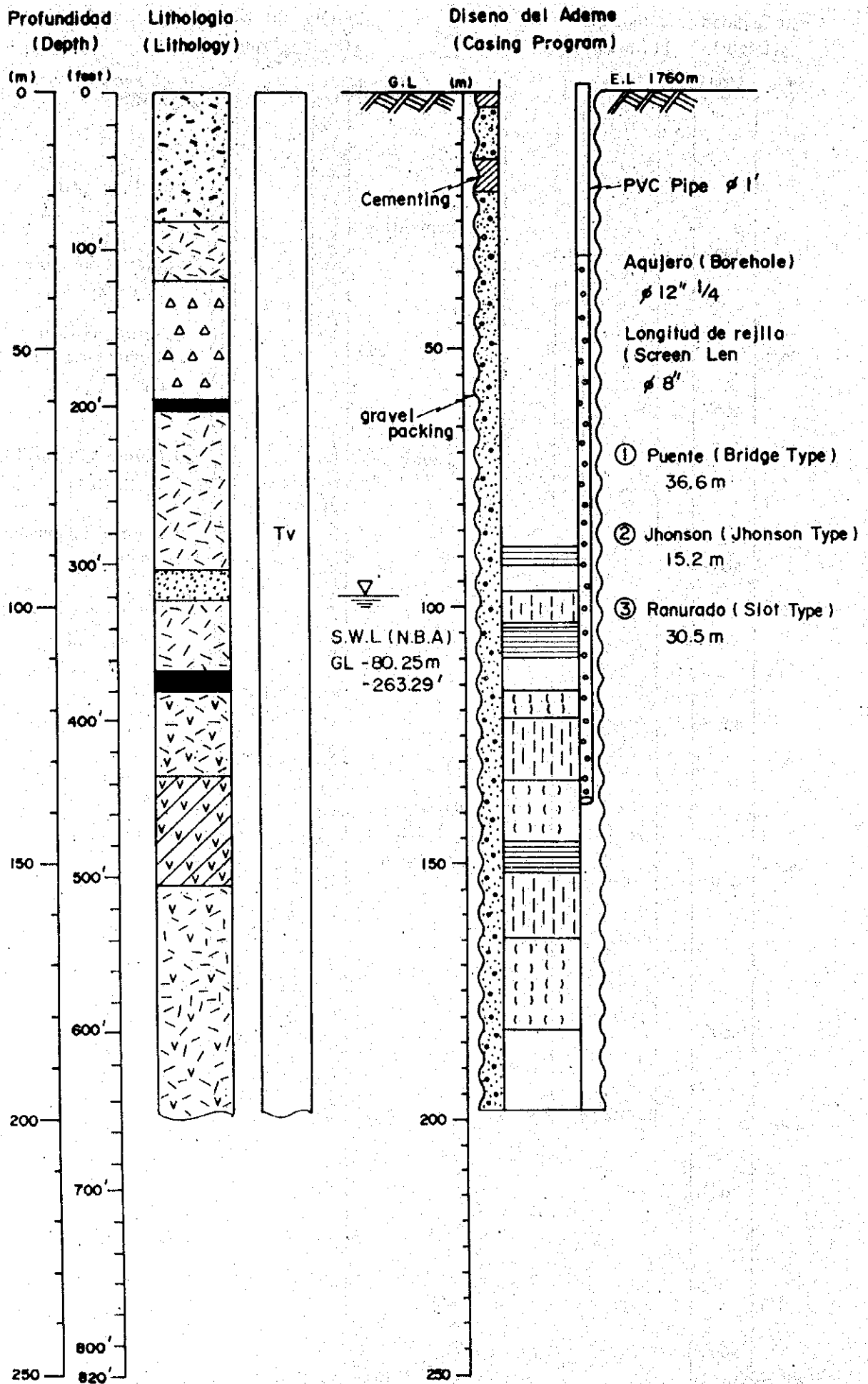


Fig. Casing Program and Lithology of JICA Test Well
(San Martín Jilotepeque)

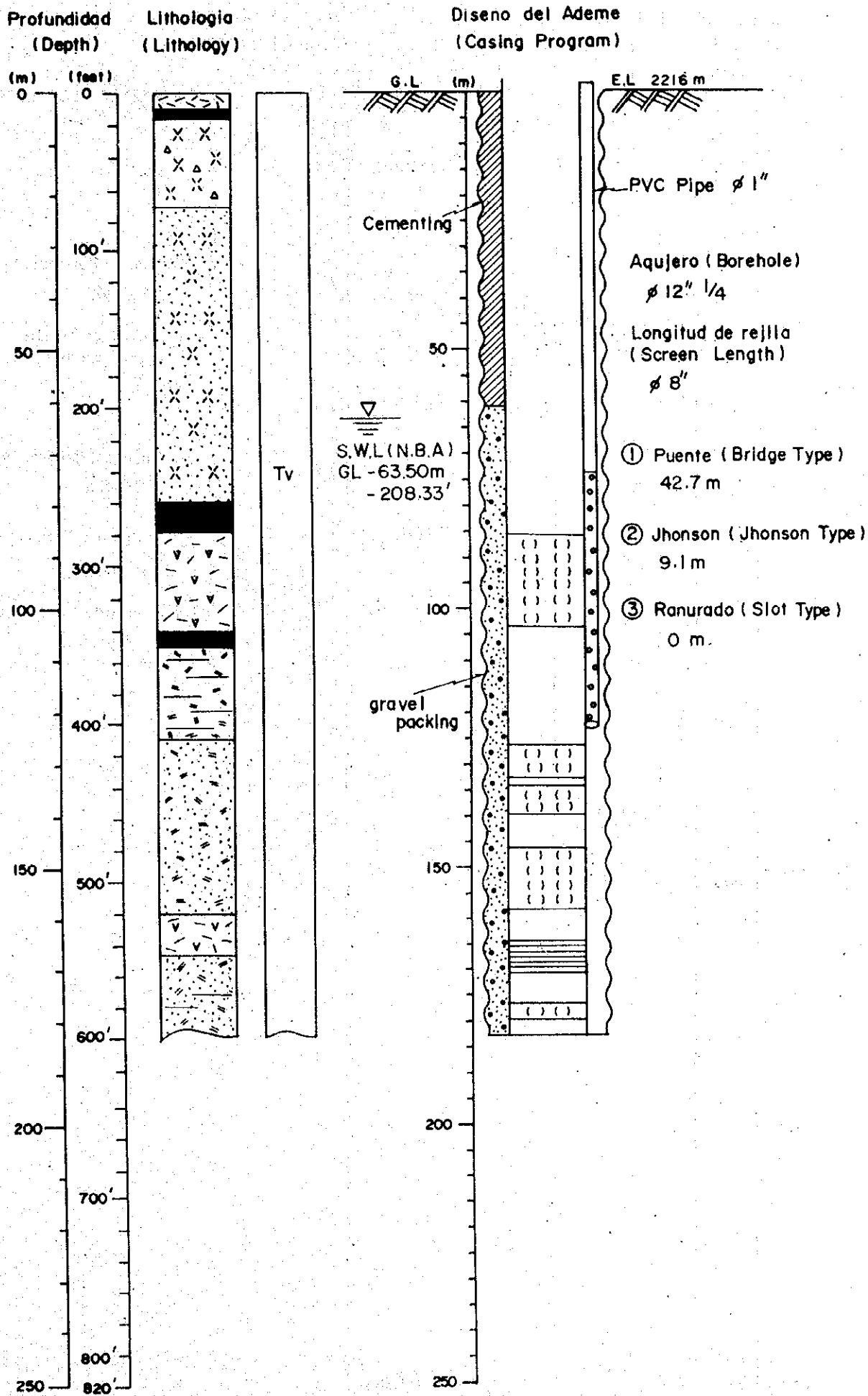


Fig. Casing Program and Lithology of JICA Test Well
(Momostenango)

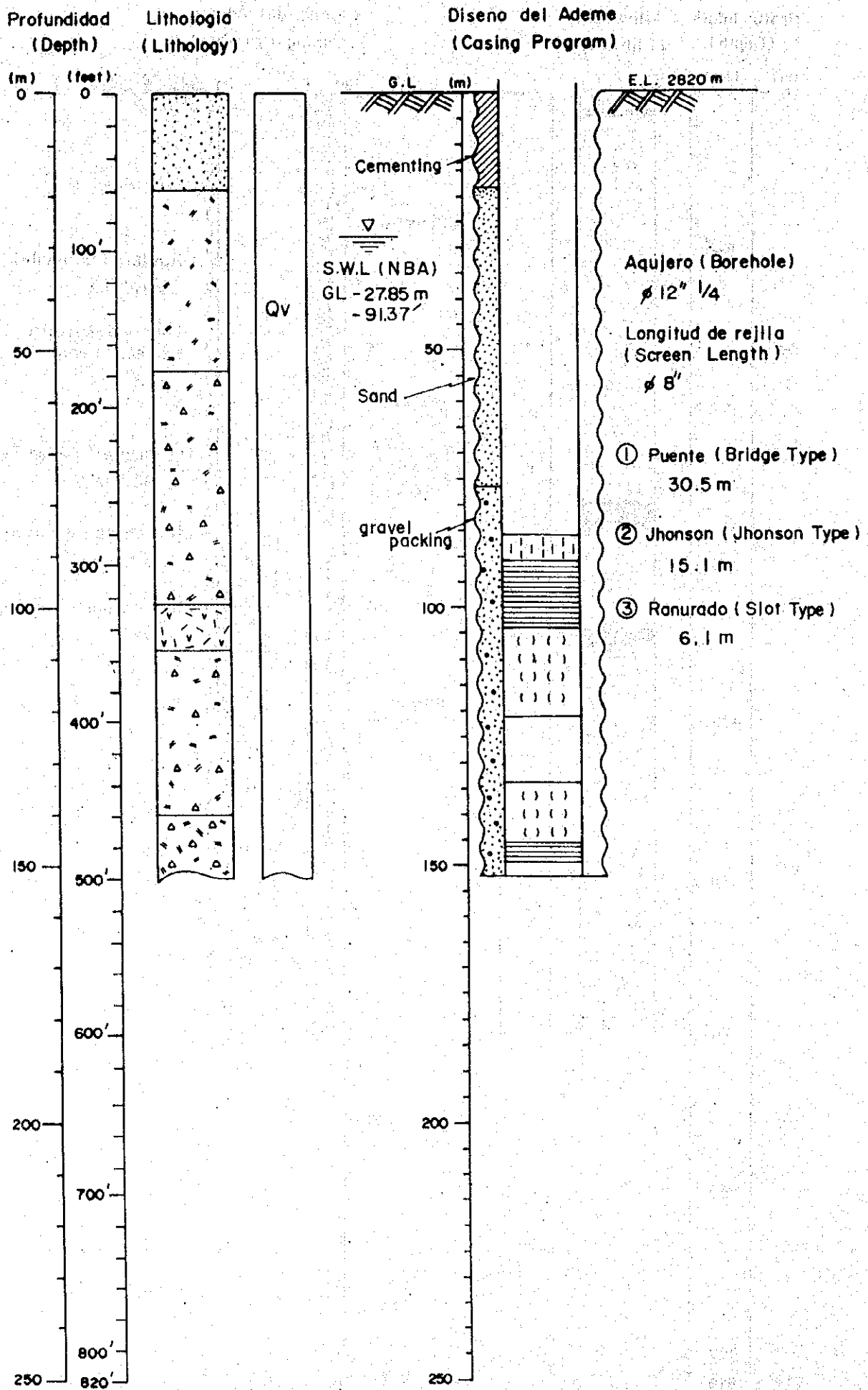


Fig. Casing Program and Lithology of JICA Test Well
(Genova)

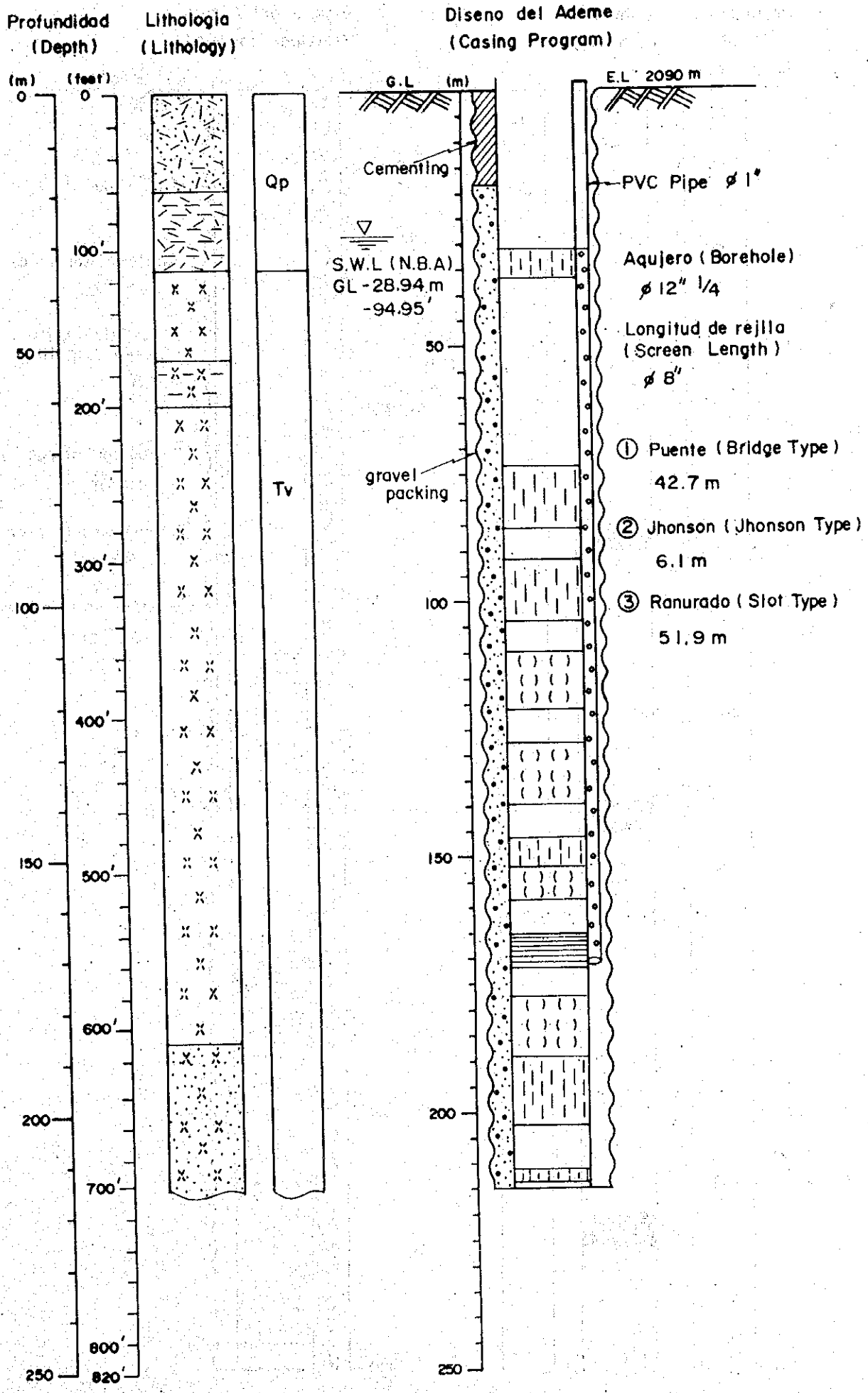


Fig. Casing Program and Lithology of JICA Test Well
(San Juan Comalapa)

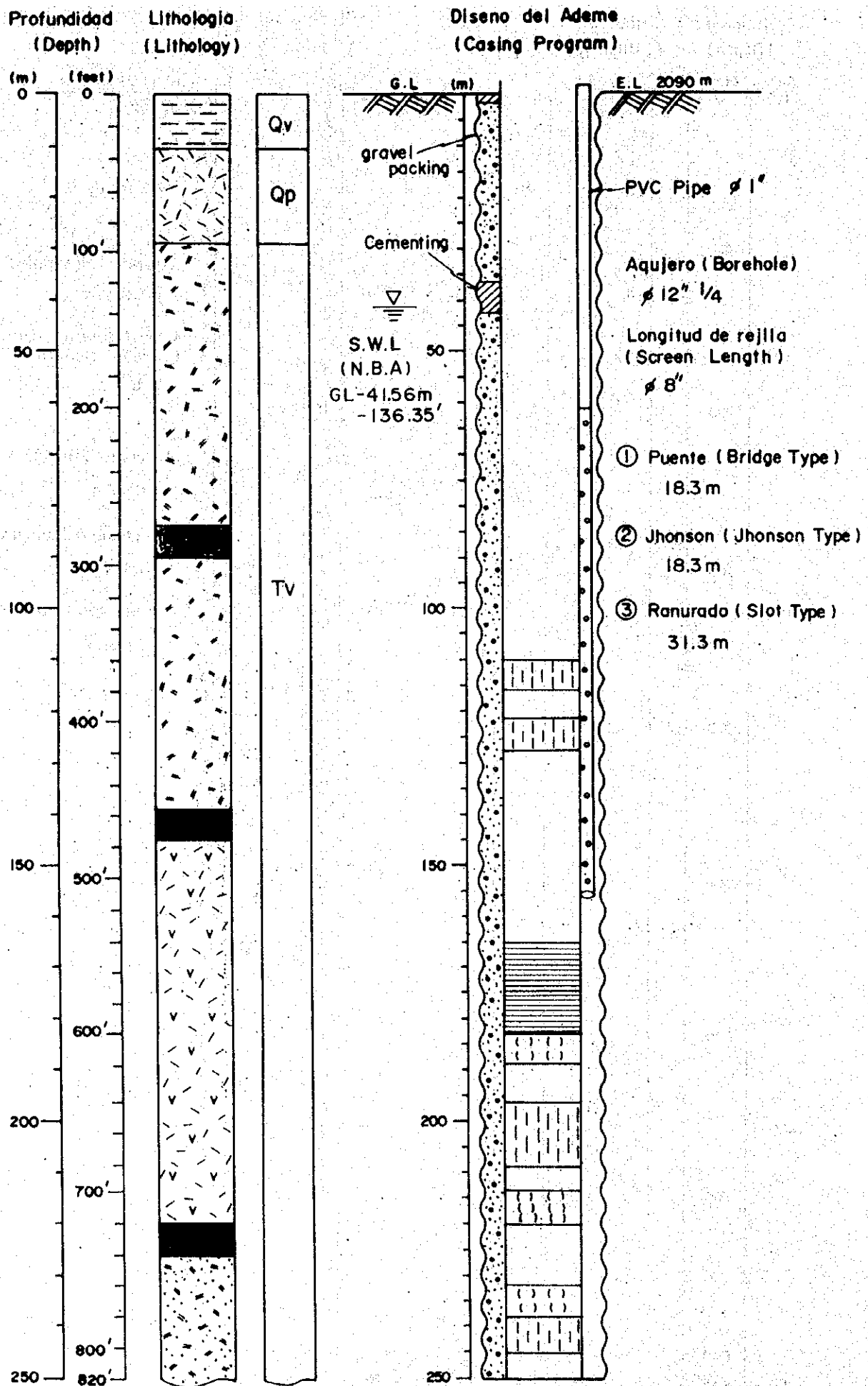


Fig. Casing Program and Lithology of JICA Test Well
(San Pedro Sacatepequez)

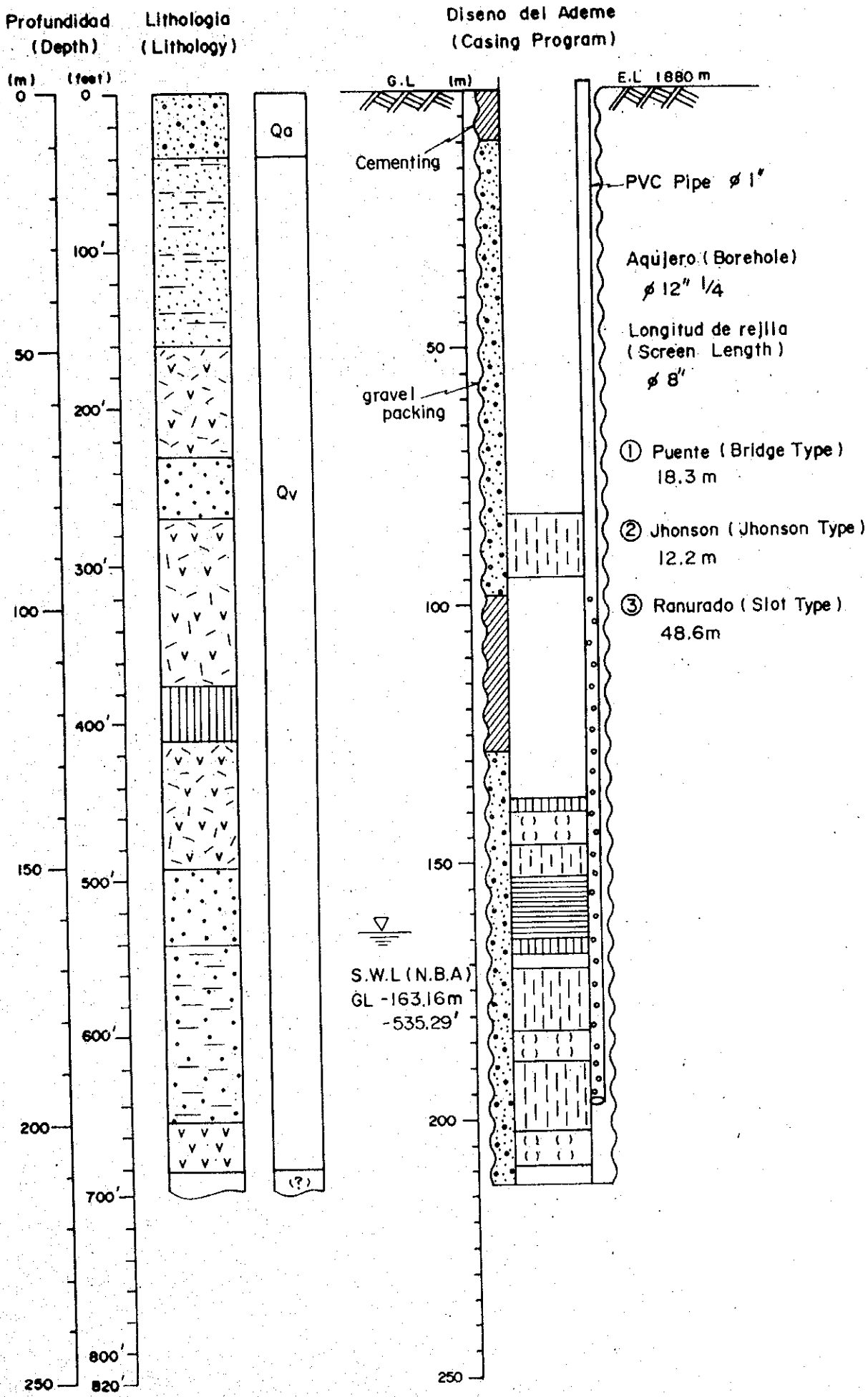


Fig. Casing Program and Lithology of JICA Test Well
(Santa Maria de Jesus)

2.2

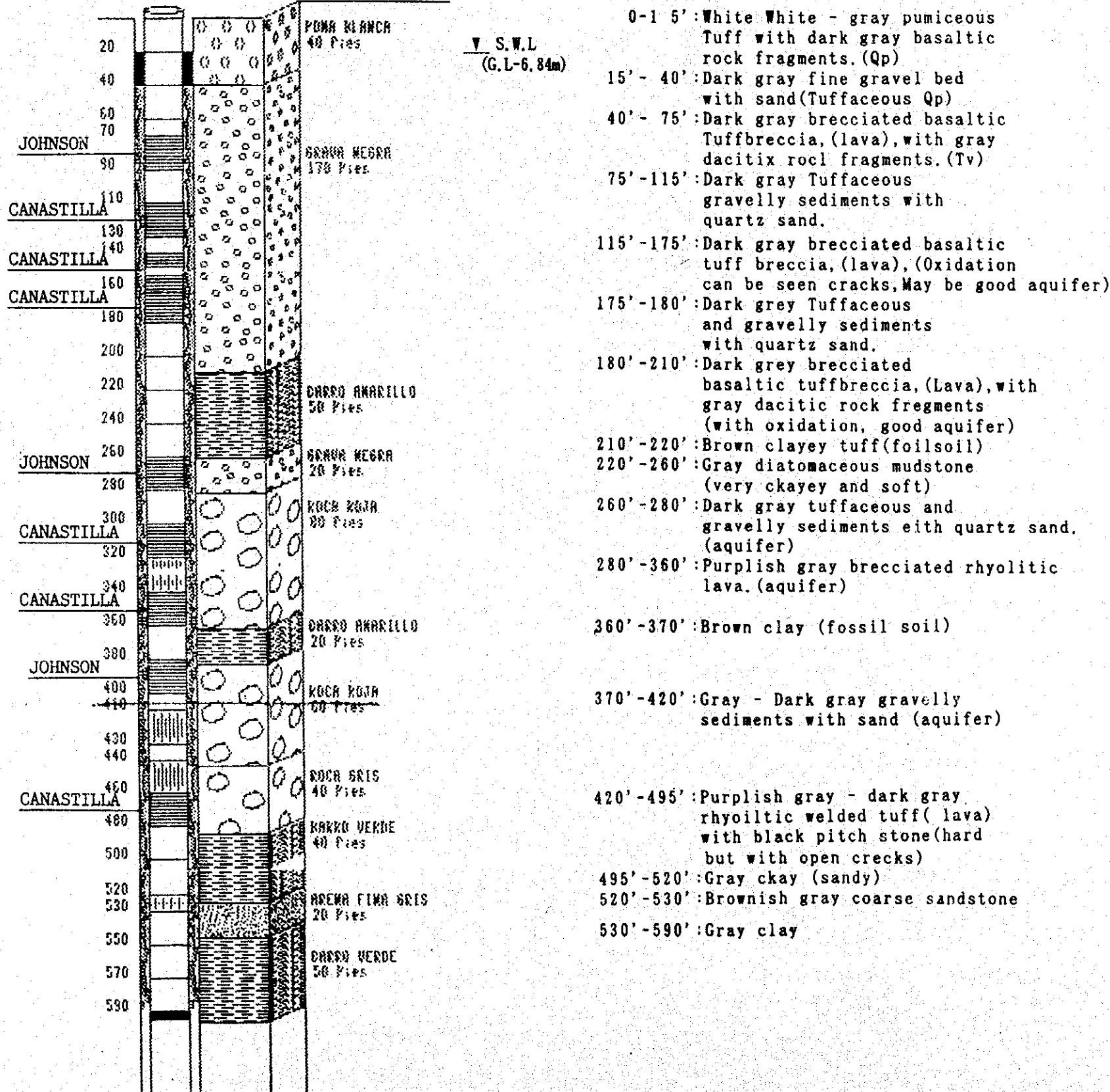
Well logs of JICA Test Tells

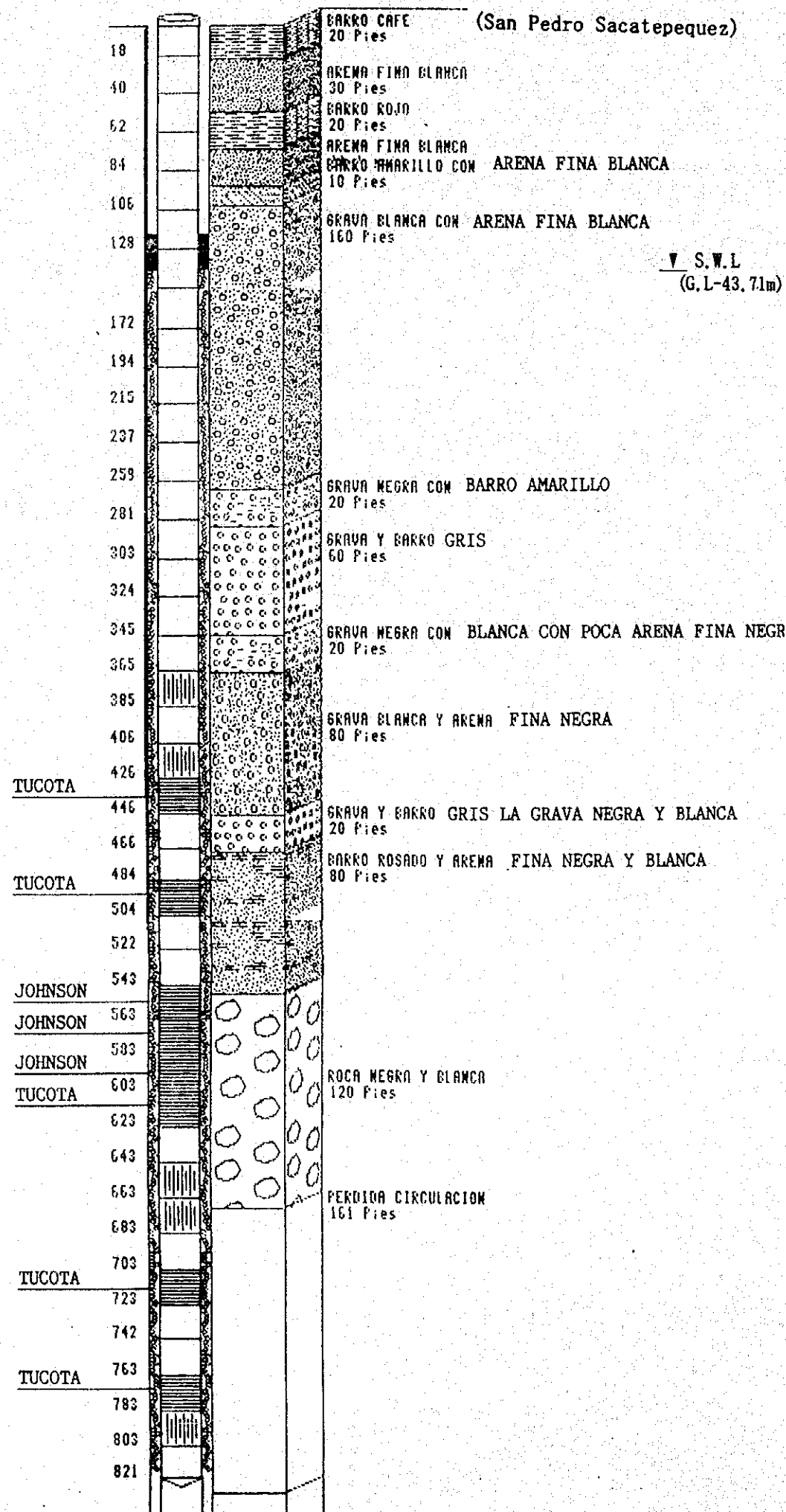
CODIGO DEL POZO: 12894
 NOMBRE PROPIETARIO: JICA - I N F O M
 UBICACION POZO: SAN JOSE PINULA, GUATEMALA

FECHA DE INICIO: 09/06/94
 FECHA DE FINALIZACION: 10/10/94
 POZO No. 1
 PERFORADORA: FAILING - 1
 METODO: ROTATIVO
 PERFORADOR: JORGE RUFINO REYES MALDONADO
 DIAMETRO: 8 Pulgadas.
 PROFUNDIDAD POZO: 590 Pies

TOTAL RAMURACION: Pies
 TOTAL PICHACHAS: 70 Pies
 TOTAL REGILLA : 180 Pies
 NIVEL ESTATICO: 22 Pies
 NIVEL DE BOMBEO: 61 Pies
 PRODUCCION: 475 GPM.
 DURACION BOMBEO: 82:00 Horas
 PROFUNDIDAD DE LA BOMBA 384 Pies, de 40 H.P. de 5 Etapas.

(San Jose Pinula)





0- 25': Brown Volcanic fall deposits (Loam, Qv)

25' - 40': White gray pumiceous beds. (Quartz rich. Sandy (Qp))

40' - 50': Pale brown - yellowish white gray pumiceous beds with clay layer. (Qp) about 10 l/min. Springs from nearly 45' depth

50' - 70': White gray pumiceous bed (mostly same to 25'-40') (Qp)

70' - 85': Pale brown yellowish white gray pumiceous beds with clay and gravel layer. (Qp)
Spring stopped at 80 depth and SWL changed from 0' to 38

85' - 95': Sand and gravel beds with pumice (Qp).
(45'-95') is considered to be the upper aquifer of Qp

95' - 275': Dark gray basaltic Tuffbreccia with lava flows (Tv)
(170' - 190') & (220' - 250') are considered to be mainly composed of fractured basaltic lava (95' - 135') is considered to be dry zone

275' - 295': Brown clayey tuff (fossil soil)

295' - 445': Dark gray basaltic tuffbreccia with thin laves (405' - 425, 435' - 445' etc.) that are classified to be aquifers. (340' - 350') consists of brown tuffbreccia (maybe faulting zone)

445' - 460': white gray clayey and brecciated tuffbreccia (maybe faulting zone)

460' - 480': Reddish brown-purple gray Andesitic Tuffbreccia. (partially sheared)

480' - 575': Purplish gray (-brown) Andesitic fractured lava flow (maybe partially aquifer) with thin Tuffbreccias (collapse portion: 560' - 580')

575' - 720': Purplish dark gray fractured/sheared andesitic lava flow (maybe somewhat good aquifer)
There are many cracks with oxidation shearings between 605' and 720' depth.

720' - 750': Purplish brown clay (fossil soil)

750' - 820': Dark gray tuffaceous coarse sandstone with pale green tuff.

CODIGO DEL POZO: 12194
NOMBRE PROPIETARIO: J I C A - I N F O M
UBICACION POZO: SAN PEDRO SACATEPEQUEZ. GUATEMALA

FECHA DE INICIO: 08/21/94
FECHA DE FINALIZACION: 10/15/94
POZO No. 1
PERFORADORA: B - 1 Y TH-60
METODO: Percusión y Rotativo
PERFORADOR: BERNABE LOPEZ Y AUGUSTO BLANCO
DIAMETRO: 8 Pulgadas.
PROFUNDIDAD POZO: 821 Pies

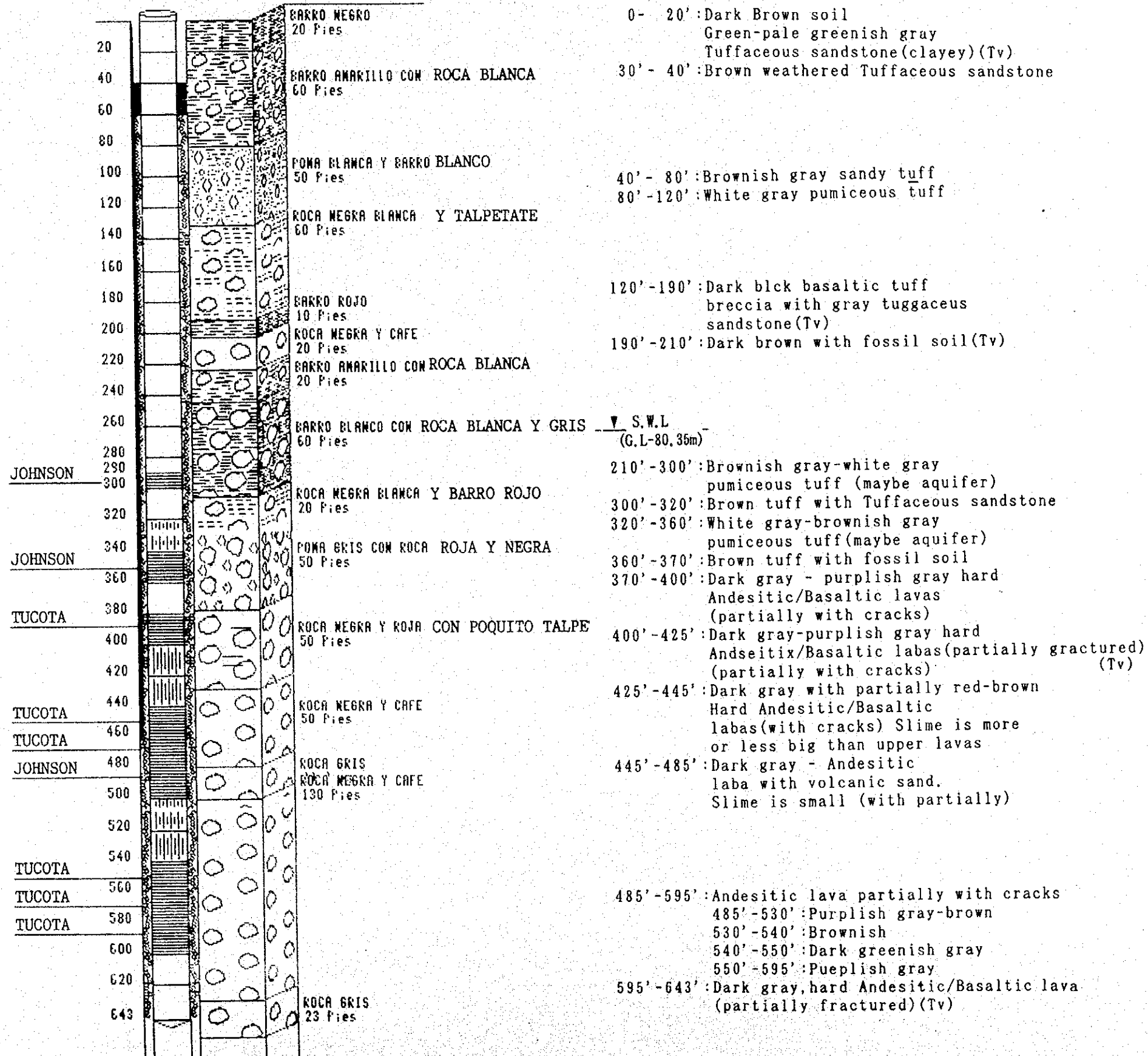
TOTAL RANURACION: Pies
TOTAL PICHACHAS: 100 Pies
TOTAL REGILLA: 160 Pies
NIVEL ESTADICO: 143 Pies
NIVEL DE BOMBEO: 195 Pies
PRODUCCION: 320 GPM.
DURACION BOMBEO: 58:00 Horas
PROFUNDIDAD DE LA BOMBA 475 Pies, de 60 H.P. de 14 Etapas.

CODIGO DEL POZO: 13094
 NOMBRE PROPIETARIO: JICA - INPOM
 UBICACION POZO: SAN MARTIN JILOTEPEC, CHIMALTEPEC

FECHA DE INICIO: 08/30/94
 FECHA DE FINALIZACION: 10/31/94
 POZO No. 1
 PERFORADORA: FAILING - 3
 METODO: ROTATIVO
 PERFORADOR: ANTONIO DE PAZ Y DAVID BLANCO
 DIAMETRO: 8 Pulgadas
 PROFUNDIDAD POZO: 643 Pies

TOTAL RAMIFICACION: Pies
 TOTAL PICHACHAS: 100 Pies
 TOTAL REGILLA: 170 Pies
 NIVEL ESTATICO: 263 Pies
 NIVEL DE BOMBEO: 294 Pies
 PRODUCCION: 401 GPM
 DURACION BOMBEO: 58:00 Horas
 PROFUNDIDAD DE LA BOMBA 520 Pies, de 60 H.P. de 14 Etapas.

D. (San Martin Jilotepeque)

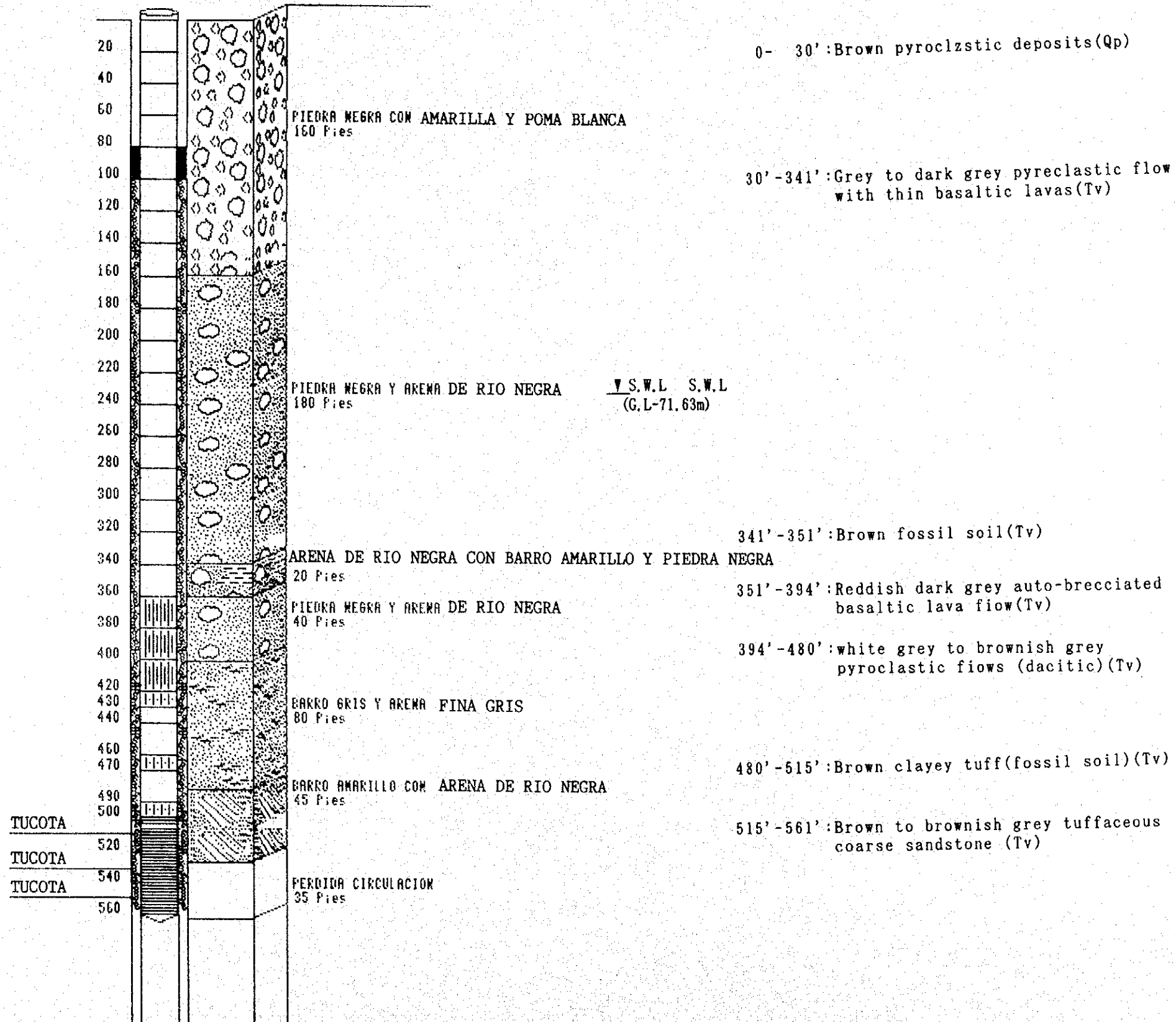


CODIGO DEL POZO: 14594
 NOMBRE PROPIETARIO: J I C A - I N F O M
 UBICACION POZO: ALDEA EL TAILON. SOLOLA. DEPTO. SOLOLA

FECHA DE INICIO: 10/17/94
 FECHA DE FINALIZACION: 11/22/94
 POZO No. 1
 PERFORADORA: CHICAGO
 METODO: ROTATIVO
 PERFORADOR: RIGOBERTO GUBIEL FERNANDEZ
 DIAMETRO: 8 Pulgadas.
 PROFUNDIDAD POZO: 560 Pies

TOTAL RAMURACION: Pies
 TOTAL PICHACHAS: 90 Pies
 TOTAL REGILLA: 60 Pies
 NIVEL ESTATICO: 253 Pies
 NIVEL DE BOMBEO: 433 Pies
 PRODUCCION: 383 GPM.
 DURACION BOMBEO: 60:00 Horas
 PROFUNDIDAD DE LA BOMBA 455 Pies, de 60 H.P. de 14 Etapas.

(Solola)

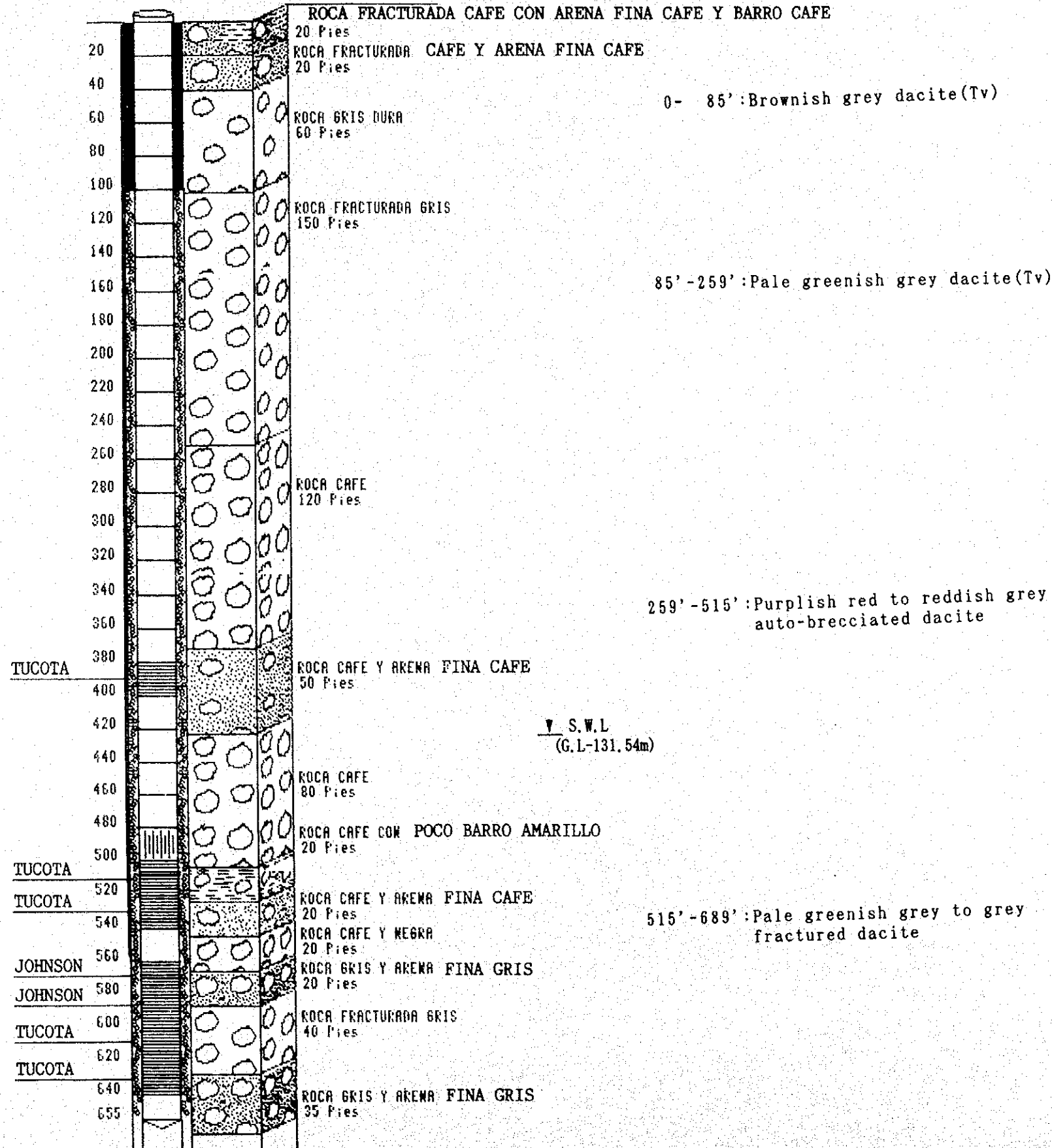


CODIGO DEL POZO: 14074
 NOMBRE PROPIETARIO: J I C A - I N F O N
 UBICACION POZO: SANTA LUCIA UTATLAN. DEPTO. SOLULA

FECHA DE INICIO: 10/10/94
 FECHA DE FINALIZACION: 11/29/94
 POZO No. 1
 PERFORADORA: SPEEDSTAR
 METODO: ROTATIVO
 PERFORADOR: JUAN DE DIOS CALITO RIVAS
 DIAMETRO: 8 Pulgadas.
 PROFUNDIDAD POZO: 655 Pies

TOTAL RAMIFICACION: Pies
 TOTAL PICHACHAS: 20 Pies
 TOTAL REGILLA : 140 Pies
 NIVEL ESTATICO: 432 Pies
 NIVEL DE BOMBEO: 461 Pies
 PRODUCCION: 162 GPM.
 DURACION BOMBEO: 38:00 Horas
 PROFUNDIDAD DE LA BOMBA 652 Pies, de 40 H.P. de 22 Etapas.

D (Santa Lucia Utatlan)

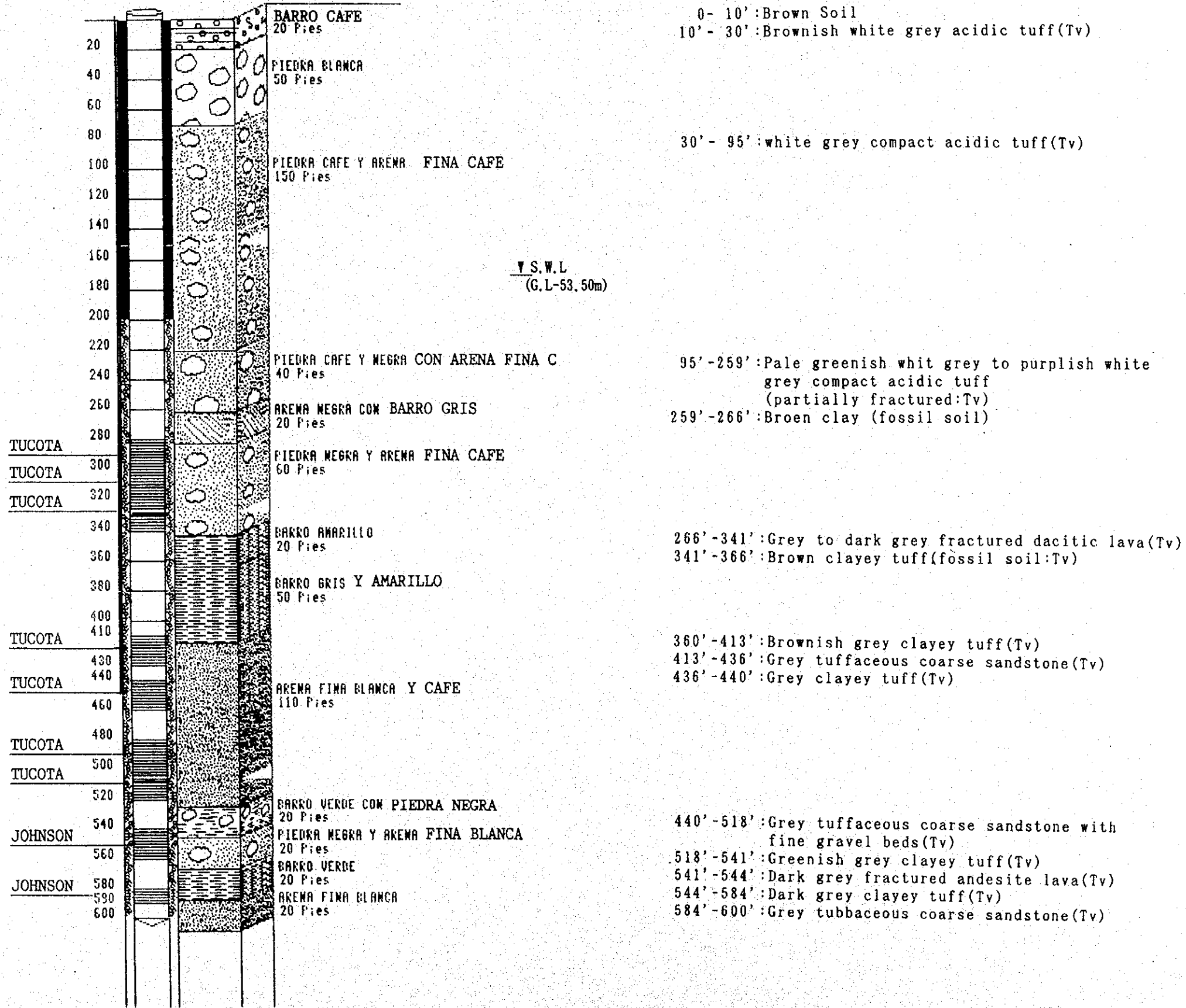


CODIGO DEL POZO: 15994
 NOMBRE PROPIETARIO: J I C A - I N F O H
 UBICACION POZO: MOMOSTENANGO. DEPTO. TOTONIGAPAN

FECHA DE INICIO: 11/21/94
 FECHA DE FINALIZACION: 12/10/94
 POZO No. 1
 PERFORADORA: FAILING - 3
 METODO: ROTATIVO
 PERFORADOR: DAVID BLANCO Y ANTONIO DE PAZ
 DIAMETRO: 8 Pulgadas.
 PROFUNDIDAD POZO: 600 Pies

TOTAL RAMURACION: Pies
 TOTAL PICHACHAS: 0 Pies
 TOTAL REGILLA: 170 Pies
 NIVEL ESTATICO: 213 Pies
 NIVEL DE BOMBEO: 439 Pies
 PRODUCCION: 200 GPM.
 DURACION BOMBEO: 58:00 Horas
 PROFUNDIDAD DE LA BOMBA 581 Pies, de 60 H.P. de 14 Etapas.

DD: (Momostenango) |



2.3

Drilling Daily report of
JICA Test Wells



INFORME DIARIO DE PERFORACION

PROPIEDAD : J I C A - I N F O M
 POZO UBICADO : SAN JOSE PINULA, GUATEMALA
 EQUIPO: MAQ. FAILING - 1

OP. JORGE REYES

FECHA	TRABAJO REALIZADO	PIES PERFORADOS	HORAS TRABAJADAS
<u>SEPTIEMBRE/1994</u>			
6	Traslado de equipo, y comenzar instalaci3n de la (MAQUINARIA "FAILING - 1")		8
7	DESCANSO		--
8	Reparaci3n de la maquinaria		6
	Perforando	80'	6
	Perforando	60'	12
9	Perforando	145'	12
10	Perforando	35'	12
11	DESCANSO		--
12	Perforando	60'	12
13	Perforando	60'	12
14	Perforando	30'	12
15	Perforando	15'	12
16	al 18 DESCANSO		--
19	Perforando	35'	12
20	Perforando	40'	12
21	Perforando	30'	6
	Rimando y circulando el pozo		6
22	Rimando el pozo		4
	Haciendo registro electrico, toma de temperatura y rayos gama		3
	Rimando el pozo		5
23	Haciendo prueba de cubeteo		2
	Rimando el pozo		8
24	Rimando el pozo		5
	Entubaci3n del pozo (590 pies en 8"Ø)		8
25	Desarrollo y limpieza de pozo		12
26	Desarrollo y limpieza de pozo		12
27	Reparaci3n de la maquinaria		12
28	Desarrollo y limpieza de pozo		12
29	Desarrollo y limpieza de pozo		12
30	Desarrollo y limpieza de pozo		12
<u>OCTUBRE/1994</u>			
1	Desarrollo y limpieza de pozo		12
2	DESCANSO		--
3	Desarrollo y limpieza de pozo		10
V A N		590'	269

San Jose Pinula

FECHA	TRABAJO REALIZADO	PIES PERFORADOS	HORAS TRABAJADAS
<u>OCTUBRE/1994</u>	<u>V I E N E N</u>	<u>590'</u>	<u>269</u>
4	Desarrollo y limpieza de pozo Descargar la bomba		11 1
5	Instalación de bomba y equipo P/prueba bombeo En prueba de bombeo, oficial Recuperación del pozo		3 10 3
6	En prueba de bombeo, oficial		15
7	En prueba de bombeo, oficial		24
8	En prueba de bombeo, oficial		24
9	En prueba de bombeo, oficial Tomar recuperacion del pozo		9 8
10	Sacar bomba y equipo de prueba de bombeo, desmontaje y regreso de la maquinaria		10
T O T A L		590'	387

INFORME DIARIO DE PERFORACION

PROPIEDAD : J I C A - I N F O M

POZO UBICADO : SAN PEDRO SACATEPEQUEZ, GUATEMALA

EQUIPO : MAQ. "B-1" / "TH-60" OP. BERNABE LOPEZ Y AUGUSTO BLANCO

FECHA	TRABAJO REALIZADO	PIES PERFORADOS	HORAS TRABAJADAS
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AGOSTO/1994

21	Traslado de equipo, y comenzar instalación de la (MAQUINARIA "BUCYRUS - 1")		9
22	Instalación de la maquinaria		10
23	Perforando	80'	11
24	Perforando	80'	14
25	Perforando	95'	12
26	Perforando	80'	14
27	Perforando	85'	14
28	Perforando	50'	14
29	Perforando	35'	14
30	Perforando	35'	14
31	Perforando	35'	14

SEPTIEMBRE/1994

1	Perforando	30'	12
2	Perforando	30'	14
3	Perforando	10'	14
4	Perforando	15'	12
5	Sacando relleno del pozo Pescando y sacando la herramienta		3 9
6	Desmontaje de la maquinaria		8
7	al 8 DESCANSO		--
9	Haciendo pila		10
10	Traslado de equipo e instalación de la (MAQUINARIA "CYCLONE TH-60")		8
11	Instalación de la maquinaria		13
12	Reperforar relleno de 560' a 620'		10
13	Reperforar relleno de 620' a 660' Perforando	70'	4 9
14	Perforando	50'	13
15	Perforando	45'	12
16	al 19 DESCANSO		--
20	Preparar para hacer registro electrico Hacer registro electrico, resistividad potencial espontaneo, temperatura y rayos gamma		3 4

V A N

825'

298

Sam Pedro Sacatepequez		PIES	HORAS
FECHA	TRABAJO REALIZADO	PERFORADOS	TRABAJADAS
<u>SEPTIEMBRE/1994</u>		825'	298
21	Mantenimiento maquinaria		10
22	Haciendo registro electrico		4
23	Entubación del pozo (821 pies en 8"Ø)		10
24	Soplar con compresor		12
25	Desarrollo y limpieza de pozo		12
26	Desmontaje y regreso de la maquinaria		8
28	Traslado e instalación maquinaria "L-3"		3
	Desarrollo y limpieza de pozo		6
29	Desarrollo y limpieza de pozo		12
30	Desarrollo y limpieza de pozo		12
<u>OCTUBRE/1994</u>			
1	Desarrollo y limpieza de pozo		11
2	DESCANSO		--
3	Desarrollo y limpieza de pozo, aplicar químico al pozo y agitarlo		10
4	Desarrollo y limpieza de pozo		5
	Preparar para soplar con compresor		2
	Soplar con compresor (limpieza pozo)		3
5	Soplar con compresor (limpieza pozo)		12
6	Instalación de bomba y equipo P/prueba bombeo		10
	En prueba de bombeo, provisional		1
	Tomar recuperación del pozo		1
7	En prueba de bombeo, escalonada		8
	Tomar recuperación del pozo		2
8	Subir la bomba a 460 pies		3
	En prueba de bombeo, parar por fallas en bomba		4
	Tomar recuperación del pozo		3
9	Sacar bomba y equipo de prueba de bombeo desmontaje y regreso de la maquinaria		7
11	DESCANSO		--
12	Traslado e instalación maquinaria "L-6"		2
	Instalación bomba y equipo P/prueba bombeo		5
	En prueba de bombeo, larga duración		9
13	En prueba de bombeo, larga duración		24
14	En prueba de bombeo, larga duración		15
	Tomar recuperación del pozo		8
15	Sacar bomba y equipo de prueba de bombeo y desmontaje de la maquinaria		8
T O T A L		825'	540

INFORME DIARIO DE PERFORACION

PROPIEDAD : J I C A - I N F O M
 POZO UBICADO: SANTA MARIA DE JESUS, ANTIGUA GUATEMALA, SACATEPEQUEZ
 EQUIPO : MAQ. "CHICAGO" OP. RIGOBERTO GUDIEL FERNANDEZ

FECHA	TRABAJO REALIZADO	PIES PERFORADOS	HORAS TRABAJADAS
<u>SEPTIEMBRE/1994</u>			
5	Instalación de la maquinaria "CHICAGO" Perforando	90'	6 6
6	Perforando	95'	12
7	Perforando	30'	12
8	Perforando	45'	12
9	Perforando Reparación de la maquinaria	10'	4 8
10	Reparación de la maquinaria Perforando	12'	6 6
11	Perforando	18'	14
12	Reparación de la maquinaria Perforando	7'	9 3
13	Perforando	30'	12
14	Perforando	47'	12
15	Cementando el pozo para recuperar circulación		4
16	al 18 DESCANSO		--
19	Sacando relleno del pozo		9
20	Perforando lo cementando		12
21	Mantenimiento de maquinaria		12
22	Mantenimiento de maquinaria		12
23	Perforando	17'	12
24	Perforando	44'	12
25	Perforando	25'	12
26	Perforando Haciendo prueba de cubeteo Mantenimiento de maquinaria	45'	5 3 3
27	Esperando ordenes superiores		8
28	Cementando el pozo Medir con la cinta electrica		6 2
29	Reparación de la maquinaria		12
30	Reparación de la maquinaria		12
<u>OCTUBRE/1994</u>			
1	Aplicar agua al pozo Reparación de la maquinaria Revisar el nivel del agua		1 2 8

V A N

515'

269

FECHA	Santa Maria de Jesus TRABAJO REALIZADO	PIES PERFORADOS	HORAS TRABAJADAS
<u>OCTUBRE/1994</u>	<u>V I E N E M</u>	515'	269
2	DESCANSO		
3	Reparación de la maquinaria		12
4	Reparación de la maquinaria		6
	Perforar lo cementado		7
5	Perforando	141'	12
6	Hacer prueba de cubeteo		4
	Preparar para hacer prueba de cubeteo		2
	Haciendo registro electrico		3
	Circulando el pozo y acondicionar el lodo		3
	Haciendo registro electrico		3
7	Rimando el pozo		9
8	Rimando el pozo y perforando	40'	12
9	Reparación de la maquinaria		9
	Rimando el pozo		4
10	DESCANSO		--
11	Circulando el pozo		5
	Entubación del pozo (695 pies en 8"Ø)		6
12	Desarrollo y limpieza de pozo		12
13	DESCANSO		--
14	Desarrollo y limpieza de pozo		12
15	Desarrollo y limpieza de pozo		10
	Guardar accesorios		1
16	al 17 DESCANSO		--
18	Traslado e instalación maquinaria "L-5"		3
	Soplar con compresor (limpieza pozo)		7
19	Soplar con compresor (limpieza pozo)		12
20	Soplar con compresor (limpieza pozo)		12
21	Desmontaje de maquinaria, soldar tapadera al pozo, y regreso al taller		9
<u>NOVIEMBRE/1994</u>			
3	Traslado e instalación maquinaria "L-6"		5
	Instalación de bomba y equipo P/prueba bombeo		4
	En prueba de bombeo, provisional		4
4	Preparar para arrancar bombeo		2
	En prueba de bombeo, escalonada		10
	Tomar recuperación del pozo		2
5	Preparar para arrancar bombeo		1
	En prueba de bombeo, larga duración		17
6	En prueba de bombeo, larga duración		24
7	En prueba de bombeo, larga duración		7
	Tomar recuperación del pozo		8
	Sacar bomba y equipo de prueba de bombeo		3
8	Se soldar tapadera al pozo y desmontaje de la maquinaria		5
T O T A L		696'	533

INFORME DIARIO DE PERFORACION

PROPIEDAD : J I C A - I N E Q M

POZO UBICADO : SAN MARTIN JILOTEPEQUE, CHIMALTENANGO

EQUIPO : MAQ. "FAILING - 3" OP. DAVID BLANCO Y ANTONIO DE PAZ

FECHA	TRABAJO REALIZADO	PIES PERFORADOS	HORAS TRABAJADAS
<u>AGOSTO/1994</u>			
30	Haciendo pila		8
31	Haciendo pila		8
<u>SEPTIEMBRE/1994</u>			
1	Traslado de equipo, y comenzar instalación de la (MAQUINARIA "FAILING - 3")		5
2	Instalación de la maquinaria		12
3	Perforando	160'	12
4	Perforando	210'	12
5	Perforando	50'	12
6	Perforando	30'	12
7	Perforando	20'	12
8	Perforando	14'	12
9	Perforando	21'	12
10	Perforando	15'	12
11	DESCANSO		--
12	Rimando y perforando	3'	7
13	Perforando	15'	12
14	Perforando	15'	12
15	Perforando	8'	8
16	al 18 DESCANSO		--
19	Reparación de la maquinaria		7
	Perforando	3'	4
20	Perforando	16'	12
21	Perforando	21'	12
22	Perforando	22'	12
23	Rimando el pozo		7
	Haciendo registro electrico		4
	Haciendo prueba de cubeteo		2
24	Rimando el pozo		8
25	Rimando el pozo		12
26	Rimando el pozo y perforando	12'	12
27	Perforando	8'	10
	Reparación de la maquinaria		2
V A N		643'	272

San Martin Jilotepeque		PIES	HORAS
FECHA	TRABAJO REALIZADO	PERFORADOS	TRABAJADAS
<u>SEPTIEMBRE/1994</u>		643'	272
	V I E N E N		
28	Preparar para hacer registro		4
	Haciendo 2do. registro electrico		3
	Haciendo prueba de cubeteo		2
	Llenando el pozo		2
	Rimando el pozo		12
29	Rimando el pozo		6
	Esperando la tuberia		2
	Entubación del pozo (643 pies en 8"Ø)		4
	Desarrollo y limpieza de pozo		11
30	Desarrollo y limpieza de pozo		12
	Desarrollo y limpieza de pozo		12
<u>OCTUBRE/1994</u>			
1	Reparación de la maquinaria		3
2	DESCANSO		--
3	Reparación de la maquinaria		3
	Desarrollo y limpieza de pozo		7
	Desarrollo y limpieza de pozo		12
4	Desarrollo y limpieza de pozo		12
	Desarrollo y limpieza de pozo		12
5	Desarrollo y limpieza de pozo		12
	Desarrollo y limpieza de pozo		12
6	Reparación de la maquinaria		6
	Soplar con compresor (limpieza pozo)		9
	Reparación de la maquinaria		6
	Soplar con compresor (limpieza pozo)		9
7	Soplar con compresor (limpieza pozo)		3
	Desmontaje de la maquinaria		9
8	Regreso de la maquinaria		5
9	AL 16 DESCANSO		--
17	Traslado e instalación maquinaria "L-6"		8
18	Cortar tapadera del pozo e instalar bomba y equipo P/prueba de bombeo		8
	En prueba de bombeo, provisional		3
19	Esperar orden para arrancar bombeo		1
	En prueba de bombeo, escalonada		10
20	Arrancar bombeo, parar por falla del generador		1
	Esperar recuperación del pozo		1:30'
	Arrancar bombeo, y fallo nuevamente		2:30'
21	Sacar bomba y equipo de prueba de bombeo		6
22	Instalar bomba y equipo P/prueba bombeo		4
23	al 26 NO SE TRABAJO		--
27	Preparar para hacer arranque		0:30'
	Hacer arranque parar por falla		1:30'
28	En prueba de bombeo, larga duración		11:30'
29	En prueba de bombeo, larga duración		24
		V A N	544:30'
		643'	

San Martin Tlaxtepec		PIES	HORAS
FECHA	TRABAJO REALIZADO	PERFORADOS	TRABAJADAS
OCTUBRE/1994	V I E N E N	643'	544:30'
30	En prueba de bombeo, larga duración		12:30'
	Tomar recuperación del pozo		8
31	Regreso de la maquinaria		6
T O T A L		643'	571

IMPORTE DIARIO DE PERFORACION

EMPRESA : I I G A - I N E P M
 POZO UBICADO: SAN JUAN COMALAPA, DEPTO. CHIMALTENANGO
 EQUIPO : MAQ. "FALLING - 2" OR. GUSTAVO ABOLFO PORTILLO

FECHA	TRABAJO REALIZADO	PIES PERFORADOS	HORAS TRABAJADAS
OCTUBRE/1994			
12	Traslado de equipo, y comenzar instalaci"n de la (MAQUINARIA "FALLING - 2")		11
13	Instalaci"n de la maquinaria		12
14	Instalaci"n de la maquinaria		12
15	Instalaci"n de la maquinaria		4
16	DESCANSO		--
17	Esperando el agua y llenando pila		12
18	Perforando	50'	12
19	Perforando	95'	13
20	Perforando	50'	13
21	Perforando	50'	12
22	Perforando	35'	12
23	Perforando	65'	12
24	Reparaci"n de la maquinaria		12
25	Reparaci"n de la maquinaria		12
26	Perforando	55'	13
27	Perforando	55'	13
28	Perforando	60'	13
29	Perforando	20'	5
30	AL 31 DESCANSO		--
NOVIEMBRE/1994			
1	DESCANSO		--
2	Rimando el pozo		7
3	Reparaci"n de la maquinaria		8
4	Reparaci"n de la maquinaria		8
5	Reparaci"n de la maquinaria		8
6	Reparaci"n de la maquinaria		8
7	Reparaci"n de la maquinaria		8
8	Reparaci"n de la maquinaria		8
9	Reparaci"n de la maquinaria		8
10	Reparaci"n de la maquinaria Rimando el pozo		5 11
		535'	272

San Juan Camalapa		PIES	HORAS
FECHA	TRABAJO REALIZADO	PERFORADOS	TRABAJADAS
<u>NOVIEMBRE/1994</u>	V I E N E N	535'	272
11	Reparaci ⁿ de la maquinaria		5
	Perforando	50'	7
12	Perforando	50'	15
13	Perforando	70'	16
14	Circulando el pozo		4
	Haciendo registro electrico		4
	Rimando el pozo		4
15	Rimando el pozo		16
16	Rimando el pozo		8
	Estabaci ⁿ del pozo (705 pies en 8"m)		6
17	Desarrollo y limpieza de pozo		13
18	Desarrollo y limpieza de pozo		12
19	Desarrollo y limpieza de pozo		5
20	Desmontaje de la maquinaria		6
23	Traslado e instalaci ⁿ maquinaria "L-1"		10
24	Truinar instalaci ⁿ de la maquinaria		5
	Desarrollo y limpieza de pozo		5
25	Desarrollo y limpieza de pozo		2
	Soplar con compresor (limpieza pozo)		12
26	Soplar con compresor (limpieza pozo)		7
	Desarrollo y limpieza de pozo		5
	Preparar para instalar bomba		1
27	Soplar con compresor (limpieza pozo)		9
	Instalaci ⁿ de bomba y equipo P/prueba bombeo		3
28	Bajar m s la bomba		1
	En prueba de bombeo, provisional		5
29	En prueba de bombeo, escalonada		10
	Tomar recuperaci ⁿ del pozo		2
30	En prueba de bombeo, larga duraci ⁿ		16
<u>DICIEMBRE/1994</u>			
1	En prueba de bombeo, larga duraci ⁿ		24
2	En prueba de bombeo, larga duraci ⁿ		8
	Tomar recuperaci ⁿ del pozo		8
	Sacar bomba y equipo de prueba de bombeo		5
3	Soldar tapadera del pozo y desmontaje y regreso de la maquinaria		12
T O T A L		705'	543

INFORME DIARIO DE PERFORACION

PROPIEDAD : J I C A - I N F O M
 POZO UBICADO : ALDEA EL TABLON, SOLOLA, DEPTO. SOLOLA
 EQUIPO : MAG. CHICAGO PNEUMATIC OP. RIGOBERTO GUDIEL FERNANDEZ

FECHA	TRABAJO REALIZADO	PIES PERFORADOS	HORAS TRABAJADAS
<u>OCTUBRE/1994</u>			
17	Cargar la herramienta		13
18	Traslado de equipo, y comenzar instalación de la (MAQUINARIA "CHICAGO PNEUMATIC")		12
19	Instalación de la maquinaria		12
20	Instalación de la maquinaria		12
21	Perforando	165'	12
22	Perforando	315'	12
23	Perforando	67'	7
	Haciendo prueba de cubeteo		3
	Mantenimiento de maquinaria		3
24	Reparación de la maquinaria		6
	Perforando	8'	4
25	Reparación de la maquinaria		12
26	Reparación de la maquinaria		5
27	Reparación de la maquinaria		12
28	al 31 DESCANSO		--
<u>NOVIEMBRE/1994</u>			
1	DESCANSO		--
2	Traslado de personal al lugar del pozo		--
3	Reparación de la maquinaria		12
4	Sacando y perforando relleno		13
5	Perforando relleno y perforar	14'	13
6	Perforando relleno y circulando el pozo		4
	Entubación del pozo (560 pies en 8"Ø)		9
7	Desarrollo y limpieza de pozo		12
8	Desarrollo y limpieza de pozo		7
	Reparación de la maquinaria		4
9	Desarrollo y limpieza de pozo		10
	Cementar el fondo del pozo		2
10	Esperar que fraguara el cemento		9
	Desarrollo y limpieza de pozo		3
11	DESCANSO		--
12	Desarrollo y limpieza de pozo		4
	Guardar accesorios		1
15	Traslado e instalación maquinaria "L-1"		8
	Desarrollo y limpieza de pozo		4
		<u>569'</u>	<u>240</u>

V A N

<i>Solola</i>		PIES PERFORADOS	HORAS TRABAJADAS
FECHA	TRABAJO REALIZADO		
<u>NOVIEMBRE/1994</u>	V I E N E N	569'	240
16	Desarrollo y limpieza de pozo		8
	Preparar para limpiar con compresor		3
	Soplar con compresor (limpieza pozo)		4
17	Soplar con compresor (limpieza pozo)		8
	Instalación bomba y equipo P/prueba bombeo		6
	En prueba de bombeo, provisional		2
18	En prueba de bombeo, escalonada		10
	Tomar recuperación del pozo		2
19	En prueba de bombeo, larga duración		13
20	En prueba de bombeo, larga duración		24
21	En prueba de bombeo, larga duración		13
	Tomar recuperación del pozo		8
22	Sacar bomba y equipo de prueba de bombeo, hacer brocal al pozo desmontaje y regreso de la maquinaria		12
T O T A L		569'	353

PROPIEDAD: J I C A - I N E O M
 POZO UBICADO: SANTA LUCIA UTATLAM, DEPTO. SOLOLA
 EQUIPO: SPEEDSTAR OP. JUAN CALITO RIVAS

FECHA	TRABAJO REALIZADO	PIES PERFORADOS	HORAS TRABAJADAS
<u>OCTUBRE/1994</u>			
10	Traslado de equipo y comenzar instalaci'n de la MAQUINARIA "SPEEDSTAR")		13
11	Haciendo pila		12
12	Instalaci'n de la maquinaria		12
13	Perforando	26'	12
14	Perforando	16'	12
15	Perforando	13'	12
16	DESCANSO		--
17	Perforando	19'	7
18	Perforando	16'	12
19	Cementando el fondo del pozo Esperar que fraguara el cemento		6 6
20	Perforando	30'	12
21	Perforando	20'	12
22	Perforando	23'	12
23	Perforando	20'	12
24	Perforando	17'	12
25	Perforando	23'	12
26	Perforando	27'	12
27	Perforando	19'	12
28	Perforando Perforando	44' 32'	12 12
29	Reparaci'n de la maquinaria		6
30	AL 31 DESCANSO		--
<u>NOVIEMBRE/1994</u>			
1	DESCANSO		--
2	Rimando el pozo y perforando	5'	5
3	Perforando	29'	12
4	Perforando	7'	12
5	Perforando	31'	12
6	Perforando	43'	12
7	Perforando	50'	12
8	Perforando	37'	12
		<u>547'</u>	<u>307</u>

Santa Lucia Uatlam		PIES	HORAS
FECHA	TRABAJO REALIZADO	PERFORADOS	TRABAJADAS
<u>NOVIEMBRE/1994</u>	V I E N E N	547'	307
9	Perforando	30'	12
10	Perforando	33'	12
11	Perforando	30'	12
12	Perforando	15'	6
	Haciendo registro electrico		3
13	DESCANSO		--
14	Preparar para hacer prueba de cubeteo		1
	Haciendo prueba de cubeteo		3
15	Rimando el pozo		12
16	Rimando el pozo		12
17	Rimando y circulando el pozo		6
	Esperando la tuberia		2
	Entubaci'n del pozo (655 pies en 8"m)		7
18	Desarrollo y limpieza de pozo		12
19	Soplar con compresor (limpieza pozo)		12
20	Desarrollo y limpieza de pozo		6
	Soplar con compresor (limpieza pozo)		6
21	Desarrollo y limpieza de pozo		5
	Soplar con compresor (limpieza pozo)		7
22	Soplar con compresor (limpieza pozo)		7
	Desarrollo y limpieza de pozo		4
23	Soplar con compresor (limpieza pozo)		4
	Instalaci'n de bomba y equipo P/prueba bombeo		6
	En prueba de bombeo, provisional		3
24	Esperar orden superior para arrancar bombeo		6
	En prueba de bombeo, escalonada		10
	Tomar recuperaci'n del pozo		2
25	Esperar orden superior para arrancar bombeo		4
	En prueba de bombeo, larga duraci'n		14
26	En prueba de bombeo, larga duraci'n		24
27	En prueba de bombeo, larga duraci'n		10
	Tomar recuperaci'n del pozo		2
	Sacar bomba y equipo de prueba de bombeo		6
28	Hacer brocal al pozo y soldar tapadera al pozo		6
29	Desmontaje de la maquinaria		2
T O T A L		655'	555

INFORME DIARIO DE PERFORACION

PROPIEDAD : J I C A - I N F O M
 POZO UBICADO : MOMOSTENANGO, DEPTO. TONICAPAN
 EQUIPO : MAG. "FAILING - 3" OP. DAVID BLANCO Y ANTONIO DE PAZ

FECHA	TRABAJO REALIZADO	PIES PERFORADOS	HORAS TRABAJADAS
<u>NOVIEMBRE/1994</u>			
21	Traslado de la maquinaria		14
22	Términar de hacer el traslado de la maquinaria		17
23	Instalación de la maquinaria		13
24	Haciendo pila		12
	Haciendo pila		12
25	Llenando pila		4
	Perforando	35'	8
	Perforando	22'	12
26	Perforando	30'	12
	Perforando	28'	12
27	Perforando	25'	12
	Perforando	60'	12
28	Perforando	60'	12
	Perforando	100'	12
29	Perforando	125'	12
	Perforando	100'	12
30	Perforando	15'	11
	Haciendo registro electrico		5
	Haciendo prueba de cubeteo		2
	Rimando el pozo		6
<u>DICIEMBRE/1994</u>			
1	Rimando el pozo		12
	Rimando el pozo		12
2	Rimando el pozo		10
	Preparar para entubar el pozo		1
	Entubación del pozo (600 pies en 8"Ø)		5
	Desarrollo y limpieza de pozo		8
3	Desarrollo y limpieza de pozo		12
	Desarrollo y limpieza de pozo		12
4	Desarrollo y limpieza de pozo		10
	Soplar con compresor (limpieza pozo)		2
	Soplar con compresor (limpieza pozo)		12
5	Desarrollo y limpieza de pozo		12
	Desarrollo y limpieza de pozo		5
	Instalación de bomba y equipo P/prueba bombeo		7
6	En prueba de bombeo, provisional		2
	Sacar la bomba e instalar poliducto		3
	Instalar la bomba P/prueba bombeo		7
	Esperar cinta para prueba bombeo		12
7	En prueba de bombeo, escalonada		10
	Tomar recuperación del pozo		2
8	En prueba de bombeo, larga duración		18
9	En prueba de bombeo, larga duración		24
10	En prueba de bombeo, larga duración		6
	Tomar recuperación del pozo		8

T O T A L 600' 424

INFORME DIARIO DE PERFORACION

PROPIEDAD : JICA - INFOM

POZO UBICADO: GENOVA, COATEPEQUE

EQUIPO : MAQ. "CYCLONE TH-60"

OP. AUGUSTO BLANCO CORBOVA

FECHA	TRABAJO REALIZADO	PIES PERFORADOS	HORAS TRABAJADAS
<u>NOVIEMBRE/1994</u>			
20	Traslado de equipo, y comenzar instalaci ⁿ de la (MAQUINARIA "CYCLONE TH-60")		6
21	Instalaci ⁿ de la maquinaria		13
22	Perforando	70'	16
23	Perforando	65'	16
24	Perforando	85'	16
25	Perforando	85'	16
26	Mantenimiento de maquinaria		13
27	Perforar relleno del pozo		9
28	Reparaci ⁿ de la maquinaria Perforando	20'	8 6
29	Perforando	100'	16
30	Perforando	80'	13
<u>DICIEMBRE/1994</u>			
1	Haciendo registro electrico Rinando el pozo		3 7
2	Tratar de entubar el pozo Rinando el pozo		6 7
3	Rinando el pozo Entubaci ⁿ del pozo (500 pies en 8"m) Desarrollo y limpieza de pozo		10 4 5
4	Desarrollo y limpieza de pozo Soplar con compresor (limpieza pozo) Desmontaje de la maquinaria		7 2 6
5	Traslado e instalaci ⁿ de la maquinaria "L-1"		12
6	Desarrollo y limpieza de pozo		15
7	Desarrollo y limpieza de pozo Soplar con compresor (limpieza pozo)		3 10
8	Soplar con compresor (limpieza pozo)		14
9	Instalaci ⁿ de bomba y equipo P/prueba bombeo En prueba de bombeo, provisional Tomar recuperaci ⁿ del pozo		6 2 2
10	En prueba de bombeo, escalonada Tomar recuperaci ⁿ del pozo		10 2
11	En prueba de bombeo, larga duraci ⁿ		15
12	En prueba de bombeo, larga duraci ⁿ		24
13	En prueba de bombeo, larga duraci ⁿ Tomar recuperaci ⁿ del pozo		9 8

T O T A L 505' 337

CONTRACT AGREEMENT

ON

TEST WELL CONSTRUCTION

AND

PUMPING TEST

FOR

THE GROUNDWATER DEVELOPMENT STUDY

IN THE CENTRAL PLATEAU AREA

IN

THE REPUBLIC OF GUATEMALA

AUGUST, 1994

JICA STUDY TEAM

and

DAHO POZOS, S.A.

46

[Handwritten signature]

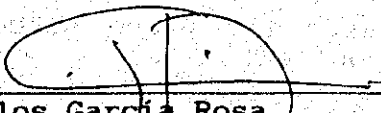
AGREEMENT
ON
TEST WELL CONSTRUCTION AND PUMPING TEST
FOR
THE GROUNDWATER DEVELOPMENT STUDY
IN THE CENTRAL PLATEAU AREA IN
THE REPUBLIC OF GUATEMALA

This Contract made and entered into the fourth of August, 1994 and between JICA Study Team (hereinafter referred to as "the Engineer" which shall include its legal successors and assigns), having its Office at c/o INFOM and DAHO POZOS, S.A. (hereinafter referred to as "the Contractor" which shall include its legal successors and assigns), having its principal office at 17, 26-02, Zona 11, Guatemala, witness that the parties covenant, promise, and agree each with the other as follows:

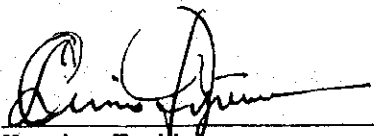
- (1) The Contractor agrees to do and complete all the construction work (hereinafter referred to as "the works") in accordance with the terms, conditions and requirements of this Contract.
- (2) The Engineer agrees to pay the Contractor in consideration of the fulfillment of the works, the Contract price of US\$ Four hundred eighty nine thousand and fourty only (US\$ 489,040) in accordance with the terms and conditions. It is agreed that the terms, conditions specified in Clause 12 of General Condition. It is agreed that the terms, conditions and requirements of the Contract shall prevail except to the extent that they are expressly modified or altered by this Contract. In witness whereof, each of the parties hereto has caused this Contract to be executed in duplicate as of the date first above written by its duly authorized representative.

The Contractor

Japan International
Cooperation Agency (JICA)



Carlos Garcia Rosa
General Manager,
DAHO POZOS, S.A.



Kunio Fujiwara
Team Leader
JICA Study Team

GENERAL CONDITIONS

1. DEFINITIONS

The following words and expressions shall have the meaning assigned to them except where the context otherwise requires:

- (a) "JICA" shall mean Japan International Cooperation Agency, the official agency responsible for the implementation of the technical Cooperation of the Government of Japan, having an address of its head office at
- Shinjuku Mitsui Bldg.,
1-1, Nishi-Shinjuku 2-chome,
Shinjuku, Tokyo, 163 Japan
- (b) The "JICA Study Team" shall mean a person or persons appointed by JICA to supervise the Works at the Site and/or in other places in the Republic of Guatemala where the Contract has to be carried out or is in progress to be carried out.
- (c) The "Engineer" shall mean JICA Study Team having its office in Guatemala at an address of c/o INFOM, Guatemala and shall include its legal successors and assigns.
- (d) The "Contractor" shall mean any person, firm or company whose tender has been accepted by the Engineer and approved by JICA, and shall include the Contractor's personnel representative, its legal successors and assigns.
- (e) The "Contract" shall mean the agreement between the Engineer and the Contractor, and include, General Conditions, Technical Specifications and Price Schedules.
- (f) The "Works" shall mean the works for the test well construction and pumping test to be done by the Contractor under the Contract.
- (g) The "Contract Price" shall mean the sum named in the Contract as the Contract price.
- (h) The "Price Schedule" shall mean the price schedule annexed or issued under the Contract.
- (i) The "Unit Price" shall mean the unit price stated in the Price Schedule attached to the Contract.
- (j) The "Technical Specifications" shall mean the specifications annexed hereto.

- (k) The Project shall mean the Water Supply project for the selected municipalities of the Republic of Guatemala.
- (l) The "Site" shall mean the places of the test drillings and pumping test.
- (m) "Day, Week, Month, Year" shall mean calendar day, calendar week, calendar month and calendar year.
- (n) "Approval" or "Approved" shall mean approval or approved in writing by the Engineer.
- (o) "Writing" shall mean any manuscript, typewritten or printed statement under seal or hand.

Words importing the singular only also include the plural and viceversa where the context requires. The fact that the words defined in this Clause are or are not capitalized in the Contract shall not affect their meaning.

2. CONTRACTOR TO INFORM HIMSELF FULLY

The Contractor shall be deemed to have satisfied himself as to all the conditions and circumstances affecting the Contract Price, and to have fixed these prices according to his own view for these as no additional allowances, except as otherwise expressly provided, will afterwards be made beyond the Contract Price.

The Contractor shall be responsible for any misunderstanding or incorrect information, however obtained except information given in writing by the Engineer.

3. EFFECTIVE DATE OF CONTRACT AND COMMENCEMENT OF THE WORKS

The Contract shall be effective on the date when the Contract has been approved by JICA.

The Contractor shall commence the Works upon receipt of "Notice to Proceed" which will be issued by the Engineer.

4. MANNER OF EXECUTION

- 1) All the Works to be done under the Contract shall be executed in accordance with the Technical specifications, or where not specified therein in accordance with such instructions and orders as the Engineer may give.
- 2) If the Contractor shall, by written notice to the Engineer within seven (7) days after receiving any decision, instruction or order of the Engineer, intimate that he disputes or questions the decision for so doing, either party shall be at liberty to

refer the matter to arbitration pursuant to Clause 23 "Arbitration", but such an intimation shall not relieve the Contractor of his obligation to proceed with the Works in accordance with the decision, instruction, or order in respect of which the intimation has been given.

5. INFORMATION AND OFFICIAL PERMISSION

- 1) The Engineer shall make available to the Contractor for the purpose of performing the Works which are listed in the Technical Specifications contained herein.
- 2) Official permission from the authorities concerned for the execution of the Works at the site shall be arranged by the Contractor at his own expenses.

6. CONTRACTOR'S REPRESENTATIVE AND PERSONS

- 1) The Contractor shall make his own arrangements for the engagement of all the engineers, technicians and labourers necessary for the execution of the Works. The Contractor shall submit to the Engineer for approval a complete list of principal staff showing names, functions, personal histories and periods of assignments prior to commencement of the Works.
- 2) The Contractor shall appoint one or more competent representatives among the Contractor's engineers assigned to the Works, to superintend the carrying-out of the Works on the Site. The names, training and experience of the Contractor's representatives shall be submitted to the Engineer for approval before they are appointed. The said representative, or if more than one shall be appointed, then one such representative shall be present on the Site during working hours, and any orders or instructions which the Engineer may give to the said representative of the Contractor shall be deemed to have been given to the Contractor by the Engineer.
- 3) The Contractor shall be responsible for observation of all regulation and safety precautions imposed by labour legislation and authorities.
- 4) The Engineer shall be at liberty by notice in writing to the Contractor to object to any representative or other persons employed by the Contractor in the execution of the Works who shall, in the opinion of the Engineer, misconduct himself of being incompetent or negligent or being sick and the Contractor shall remove such person from the Works and provide an acceptable replacement for such person at the Contractor's expense.

7. WORKING DAYS AND HOURS

The Contractor shall carry out the Works on the Site continuously during the working hours generally recognized in the Republic of Guatemala. The Contractor may, with the arrangement of the Engineer, carry out works at other time if it shall be so directed by the Engineer.

8. MATERIALS, EQUIPMENT AND FACILITIES TO BE PROVIDED BY THE CONTRACTOR

The Contractor shall at his own expense supply and provide all the equipment, materials and labour and other things or every kind required for the execution and completion of the Works.

9. PROGRAM TO BE FURNISHED

- 1) The Contractor shall submit to the Engineer for his approval his proposed time schedule and field operation programme for each item of the Works. After approval by the Engineer of such time schedule and field operation programme, the completion time for the Works stipulated in the same time schedule shall be considered as "Guaranteed Time for Completion of the Works", and the Contractor shall adhere to the order of procedure, method and time schedule stated unless he obtains the written permission of the Engineer to vary such order or method or time schedule.
- 2) Such time schedule and field operation programme shall be supplemented by the Contractor in weekly progress reports indicating the actual state of progress of all items during the course of the Works at the Site. The form and substance of such weekly reports shall be satisfactory to the Engineer. In addition, the Contractor shall submit to the Engineer the monthly progress reports stating the actual state of the Work done at the site during the preceding month. Such monthly progress reports shall be submitted to the Engineer within one week after the end of preceding month.
- 3) In the course of the Works, when the Engineer calls the Contractor for meeting, the Contractor and/or his representatives shall at any time and at his own expense attend the meeting and shall report all actual state of Works.

10. INSURANCE

- 1) Contractor shall at his expense effect accident and injury insurance for engineers, technicians and labourers employed by the Contractor for the Execution of the Works, and shall keep the Engineer free from any claim for the compensation of such accident and

injury.

- 2) The Contractor shall at his expense insure the equipment, materials and facilities to be provided by the Contractor and keep each part thereof insured for its full value against loss, damage and fire.

11. FORCE MAJEURE

- 1) If either party is temporarily unable by reason of force majeure or the law or regulation of the Republic of Guatemala to meet any of its obligation under the Agreement, and if such party gives to the other party written notice of the event within fourteen (14) days after its occurrence, such obligations of the party as it is unable to perform by reason of the event shall be suspended as long as the inability continues.
- 2) Neither party shall be liable to the other party for loss or damage sustained by such other party arising from any event referred to in Clause 11 (1) or delays arising from such event.
- 3) The term "Force Majeure" as employed herein shall mean Act of God, strikes, lock-outs or other industrial disturbances, acts of the public enemy, wars, blockades, earthquakes, storm, lightning, floods, washouts, civil disturbances, explosions, and any other similar events, beyond the control of either party and which by the exercise of due diligence neither party is able to overcome.

12. TERMS OF PAYMENT

- 1) The payment for the Works shall be made by the Engineer to the Contractor in the following manner:
 - (a) The Contractor shall submit their invoice approved by the Engineer for the actual work performed by the Contractor. The amount of such invoice shall be ascertained based on the unit prices specified in the Price Schedule.
 - (b) Payment Schedule
 - The first payment: US\$ One hundred ninety five thousand six hundred only (US\$ 195,600 US\$).
About 40% of the Contract Cost:
As soon as the Agreement has been signed.
 - The second payment: US\$ One hundred forty six thousand seven hundred only (US\$ 146,700)
About 30% of the Contract Cost:

Immediately after 50% completion of the Works.

- Third payment: US\$ Ninety seven thousand eight hundred only (US\$ 97,900).

About 20% of the Contract Cost:
Immediately after 90% completion of Works.

- (c) The final installment including the ten percent (10%) retained in (b) above, US\$ Fourty eight thousand nine hundred fourty only (US\$ 48,940), shall be paid by the Engineer to the Contractor within ten (10) days after issuance of a Certificate of Completions of the Works.
- 2) No extra payments in respect of overtime, holiday works, additional equipment, materials and facilities, or special conditions of hardship shall be claimed by the Contractor beyond the Contract Price, unless such payment shall have been authorized in writing by the Engineer prior to the extra cost concerned being encountered.
- 3) (a) If, upon completion of the Works, the actual total quantities of the finalized Works differ from the estimated quantities set out the Contract, or if there should arise an increase or decrease in the Contract Price from any causes, then and in such a case, an equitable adjustment shall be made to the Contract Price by mutual written agreement between the Engineer and the Contractor in accordance with the provisions of the Contract.
- (b) Unit prices state in the Price Schedule shall be fixed and shall be used in determining any adjustment to the Contract Price where applicable.
- (c) Any fluctuation in the prices of wages, materials or any other things shall not be subject of any adjustment.

13. TAXES AND RELATED CHARGES

All the income and other taxes, levies, imposes, deductions, charges, fees and similar assessments whatsoever imposed, assessed, levied or collected by the Government of the Republic of Guatemala, or any subdivisions thereof or any taxing authority therein, upon the Contractor and his staff shall be paid and/or borne by the Contractor.

14. VARIATIONS AND OMISSIONS

- 1) The Contractor shall not alter any of the Works except as directed in writing by the Engineer. The Engineer shall have full power, from time to time, during the execution of the Contract, to direct the Contractor to alter, amend, omit, add to or otherwise vary any of the Works, by notice in writing, and the Contractor shall carry out such variations.
- 2) If decrease in the Works is ordered by the Engineer, such orders shall not constitute any grounds for claim for damage or loss of anticipated profits on the works. All extra additional Works shall be performed with the same materials and workmanship as employed for the Works of similar character in the original one as far as they are applicable thereto.
- 3) In any case where such a direction involves an increase or decrease in the Contract Price, the difference in cost to the Contract, if any, occasioned by such variations, shall be adjusted from the Contract Price as the case may require, unless otherwise specified. The amount of such difference shall be ascertained and determined in accordance with the unit prices specified in the Price Schedule, so far as the same may be applicable, and where the unit prices are not contained therein, such amount shall be reasonably agreed between the Engineer and the Contractor in writing.

15. CONTRACTOR'S DEFAULT

- 1) If the Contractor shall neglect to execute the Works with the diligence and expedition or shall refuse or neglect to comply with any reasonable instructions or orders given in writing by the Engineer in connection with the Works, or shall contravene the provisions of the Agreement, the Engineer may give notice in writing to the Contractor to make good the failure, neglect or contravention complained of.
- 2) Should the Contractor fail to comply with the notice within a reasonable time from the date thereof, then and in such case the Engineer shall be at liberty to employ other workmen and forthwith execute such part of the Works as the Contractor may have neglected to do, or, if the Engineer shall think fit, it shall be lawful for him, without prejudice to any other rights he may have under the Contract, to make the Works wholly or in part out of the Contractor's hands and re-contract with any other person or persons to complete the Works or any part thereof.
- 3) The Engineer shall be entitled to retain and apply and balance which may be otherwise due by him to the Contractor, or such part thereof as may be necessary, to payment of the cost of executing the said part the

Works or completing the Works as the case may be. If the cost of completing the Works or executing part thereof as aforesaid shall exceed the balance due to the Contractor, the Contractor shall pay such excess upon the request in writing from the Engineer.

16. REJECTION

If any time before the Works are accepted by the Engineer, the Engineer shall decide that any work done by the contractor is defective or not in accordance with the Contract or that the Works or any portion thereof are defective or do not fulfill the requirements of the Contract, then the Contractor shall, with all speed and at his own expense, make good defects so specified. In case the Contractor shall fail to do so, the Engineer may take such steps at the cost of Contractor.

17. TIME FOR COMPLETION

- 1) The whole of the Works shall be completed by the 10th of december, 1994; however, time extension may be allowed as stipulated in the following paragraph
- 2) The Contractor shall not be held responsible for failure to carry out his obligations in case of force majeure, such as embargo, blockade, war, natural disasters or any disasters or any circumstances beyond his reasonable control. The Contractor shall notify the Engineer in writing within fourteen (14) days of the commencement of force majeure conditions. Depending on the production of satisfactory evidence and if the existence of force majeure conditions is accepted by the Engineer, the Engineer will grant extension of the Guaranteed Time for completion of the Works sufficient to compensate for delay due to force majeure without penalty.

18. DELAY IN COMPLETION

If the Contractor fails to complete the Works in accordance with the Contract within the time fixed by the Contract, there shall be deducted from the Contract Price as and for liquidated and ascertained damages a sum of money equal to one tenth percent (0.1%) of the Contract Price for each day between the Guaranteed Time for Completion of the Works and the actual and the actual date of completion but the amount so deducted shall not in any case exceed three percent (3%) of the Contract Price. Such deduction shall be in full satisfaction of the Contractor's liability for the said failure.

The Engineer may request the Contractor to employ additional labour or use additional equipment and materials and the Contractor will do so at his expense in case a delay in the completion of the Works has to be

expected.

19. SUSPENSION OF THE WORKS

The Contractor shall on the written order of the Engineer suspend the progress of the Works or any part thereof for time of times and in such manner as the Engineer may consider necessary and shall doing such suspension properly protect and secure the Works so far as is necessary in the opinion of the Engineer. All expenses incurred by the Contractor by reason of the suspension of the Works by the Engineer will be at the sole responsibility of the Contractor if the suspension is:

- a) Otherwise provided for in the Contract, or
- b) Necessary for the proper execution of the Works or by reason of whether conditions affecting the safety or the quality of the Works or by some defaults on the part of the Contractor, or
- c) Necessary for the safety of the Works or any part thereof.

20. CERTIFICATE OF COMPLETION OF THE WORKS

As soon as in the opinion of the Engineer, the whole of the Works shall have been satisfactorily completed, the Engineer shall issue a Certificate of Completion of Works after receiving a written application thereof. Upon issuance of such Certificate of Completion of Works, the Contractor shall cease to be under obligation under the Contract.

21. BANKRUPTCY

If the Contractor shall become bankrupt or insolvent or have a receiving order made against him, or compound with his creditors, or being a corporation, commence to be wound up, not a being member's voluntary winding up for the purpose of amalgamation or reconstruction, or carry out its business under a receiver for the benefit of its creditors or any of them, the Engineer shall be at liberty:

- 1) To terminate the Contract forthwith by notice in writing to the Contractor or to the receiver or liquidator, or to any person in whom the Contract may become vested, and to act in the manner provided in Clause 15 of the Contractor Default, as though the last mentioned notice has been the notice referred to in such Clause and the Works has been taken out of the Contractor's hand, or
- 2) To give such receiver, liquidator or other person the opinion of carrying out the Contract subject to his providing a guarantee for the due and faithful

performance of the Contract up to an amount to be agreed.

22. ASSIGNMENT AND SUB-LETTING OF THE CONTRACT

The Contractor shall not, without the prior consent in writing of the Engineer, assign or transfer the Works or the benefits or obligations thereof or any part thereof to any other persons. The Contractor shall not, without the prior consent in writing of the Engineer, which shall not be unreasonably withheld, sublet the Contract or any part thereof or make any sub-contract with any person or persons. Any such consent if given shall not relieve the Contractor from his obligations under the Contract. The sub-Contractor shall be regarded as employee of the Contractor. The Contractor shall be solely responsible for the performance of the sub-Contractor and for all payments to the sub-Contractor.

23. ARBITRATION

- (a) If any dispute or difference of any kind whatsoever shall arise between the Engineer and the Contractor in connection with the interpretation or application of the Contract, it shall be settled as much as possible by amicable arrangement between both parties. If such arrangement cannot be realized, the dispute or difference shall be settled by arbitration as provided herein.
- (b) All questions, disputes or differences arising out or in relation to the interpretation of the Contract which cannot be settled by mutual accord shall be submitted to a committee for arbitration consisting of three arbitrators, one to be nominated by the Engineer, another by the Contractor and the third as chairman by the two mentioned arbitrators above, and shall be finally settled in conformity to the rules and procedures of Conciliation and Arbitration of the International Chamber of Commerce. Such arbitration shall be held at such place and time in the Republic of Guatemala as the arbitrators may decide. Any decision, opinion, direction, certificate or valuation given by the arbitrators shall be obeyed by both parties and be final.

24. NOTICE AND CORRESPONDENCE

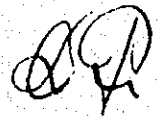
Any notice to be given to the Contractor shall be served by sending the same by post to or leaving the same at the Contractor's principal place of business, or to the address of his representative at the Site. Any notice to be given to the Engineer shall be served by sending the same by post to or leaving the same at the Engineer's address as stated in the Contract.

25. DOCUMENTS

- 1) All the correspondences, figures, drawings and other documents shall be made in the English languages or Spanish.
- 2) The several documents have to be taken as mutually explanatory of one another.

26. INSPECTION OF WORK

The Engineer shall at all times have access to the Works wherever it is in preparation or progress and the Contractor shall provide necessary facilities for such access and for inspection. Where the specifications require any work to be specially tested or approved, the Contractor shall give the Engineer timely notice of his readiness for inspection and, if the inspection is by an authority other than the Engineer, of the date fixed for such inspection.



Price Schedule for the Test Well Construction and Pumping Test in the Central Plateau Area					US\$
I t e m		Unit	Quantity	Unit Cost	Cost
Mobilization and demobiliza- tion inclu- ding site preparation	Guatemala	Unit	2	1,500	3,000
	Sacatepequez	Unit	1	1,700	1,700
	Chimaltenango	Unit	2	1,700	3,400
	Sololá	Unit	2	1,900	3,800
	Totonicapán	Unit	1	2,100	2,100
	Quetzaltenango	Unit	2	2,100	4,200
	Sub-total 10 Municipalities				
Drilling (Drill bit diameter 12 1/4")	Santa María de Jesús	feet	590	30	17,700
	Other 9 municipalities	feet	5,960	23	137,080
	Sub-total 6,560 feet (2,000 m)				
Logging	Electric resistivity	series	10	400	4,000
	Spontaneous potential	series	10	400	4,000
	Radio-active	series	10	400	4,000
	Sub-total				
Well completion works	Casing/screen installation	series	10	1,312	13,120
	Gravel/sand packing	series	10	800	8,000
	Well development/cleaning	series	10	2,400	24,000
	Pre-pumping test	series	10	2,100	21,000
	Surface cement sealing	set	10	500	5,000
	Concrete base construction				4,000
	Sub-total				
Well completion materials	φ 8" L20' blind casing	PCS	258	300	77,400
	φ 8" L20' bridge type screen	PCS	50	640	32,000
	φ 8" L10' Johnson screen	PCS	50	950	47,500
	φ 1" L20' perforated PVC pipe	PCS	200	10	2,000
	Centralizer (3 PCS/unit)	unit	50	50	2,500
	Sieved rounded gravel	m3	68	80	5,440
	Coarse sand	m3	42	80	3,360
	Cement	bag	40	6	240
	Sub-total				
Pumping Test	Stepdrawdown 5 steps	series	10	2,100	21,000
	Continuous 72 hours	series	5	3,600	18,000
	Continuous 48 hours	series	5	2,500	12,500
	Recovery	series	10	400	4,000
	Sub-total				
Well fence construction		unit	3	1,000	3,000
Grand Total					489,040

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TECHNICAL SPECIFICATION
FOR
TEST WELL CONSTRUCTION
AND
PUMPING TEST
FOR
THE GROUNDWATER DEVELOPMENT STUDY
IN THE CENTRAL PLATEAU AREA
IN
GUATEMALA

May, 1994

JICA STUDY TEAM

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11/11

1. General

The test well construction is one part of the Study on Groundwater Development in the Central Plateau Area planned by INFOM and being executed by the joint study team of INFOM and JICA (Japan International Cooperation Agency).

The test well construction works and pumping tests are to be contracted out by JICA Study Team to the local drilling firm(s).

The major purposes of the test well construction are:

- To confirm the geological composition and sequence of areas concerned by drill cuttings and geophysical logging.
- To determine the hydrogeological parameters of the aquifer by conducting pumping tests, and
- To analyze water quality, by taking water samples from drilled boreholes.

The ten (10) test wells are to be constructed in the selected ten (10) municipalities for feasibility study on water supply in the six (6) departments of QUETZALTENANGO, TOTONICAPAN, SOLOLA, SACATEPEQUEZ, CHIMALTENANGO, and GUATEMALA.

Some of the productive test wells constructed in the Study will be converted to the production wells for the practical use in the near future.

2. Scope of the Work

The work comprises of drilling and the completion of the ten (10) borehole wells with a total drilling depth about 2000 meters and ten (10) series of pumping tests. The work shall be completed within four (4) months after signing of the contract at the beginning of August, 1994. The contractor shall provide all the necessary equipment and materials for execution of the work.

The location of the 10 test well sites will be selected from the listed 15 municipalities among which the most probable 6 municipalities are marked with (⊙), and the probable 4 municipalities are marked with (○).

The accessibility to all of the drilling points is good or not poor.

The standard design of the well structure is presented in Fig. 1.

The probable municipalities where the test well construction is to be executed.

E	P	Municipality	Department
✓	⊙	San José Pinula	Guatemala
✓	⊙	San Pedro Sacatepéquez	
		San José del Golfo	
✓	⊙	Santa María de Jesús	Sacatepéquez
✓	○	Comalapa	Chimaltenango
✓	○	San Martín Jilotepeque	
✓	⊙	Sololá	
		Naualá	Sololá
✓	○	Santa Lucía Utatlán	Totonicapán
✓	⊙	Momostenango	
		Cajolá	
		Flores Costa Cuca	Quetzaltenango
	○	Génova	
		San Carlos Sija	
✓	⊙	San Francisco la Unión	

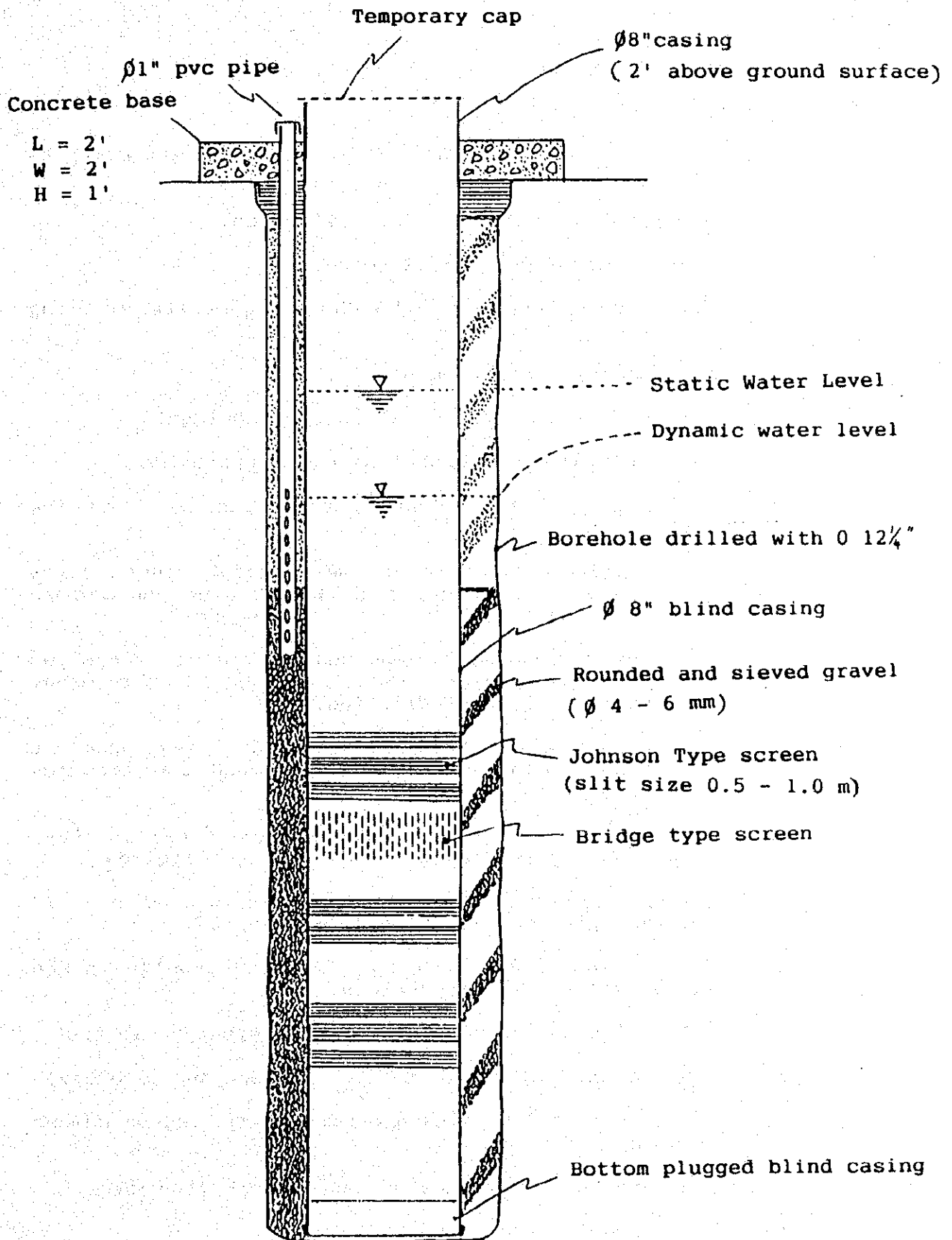
E ✓ : Geological formation has been presumed by conducting electrical resistivity sounding in addition to hydrogeological field reconnaissance

P ⊙ : Definite probability for execution of test drilling

P ○ : Tentative selection for test drilling execution, likely to be changed to non-marked municipality depending on the result of the resistivity sounding to be conducted in the Phase 2 of the Study (in August 1994)

G.R.

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A.P.

3. Technical Specification

3.1 Work Procedure

The work procedure for construction of each well shall be as follows:

- a. Mobilization and site camp setting up.
- b. Preparatory works of following:
 - b.1 Ground leveling and setting up of the drilling rig
 - b.2 Material arrangement
 - b.3 Pit digging for drill cutting sediments
 - b.4 Digging and surface casing installation
- c. Drilling to target depth accompanied by following works:
 - Static water level measurement just after finishing the day's drilling work and before starting the next day's drilling work.
 - Observation and arrangement of soil/rock samples picked up from the drill cuttings at an interval of five (5) feet drilling.
 - Record of bit type, rotation, drilling speed per hour, quantity of mud water, and the troubles encountered.
- d. Geophysical loggings (Electric resistivity, spontaneous potential and radio active logging).
- e. Casing and screen installation accompanied by 1" strainer pipe for water level monitoring.
- f. Gravel and sand packing to the annular space surrounding the casing/screen.
- g. Well cleaning, developing and preliminary pump test.
- h. Pumping test (Step drawdown, continuous and recovery).
- i. Additional sand packing and surface sealing by cement grouting.
- j. Concrete base construction and temporary capping.
- k. Site cleaning and withdrawal.

3.2 Work Schedule

The work shall be completed within four (4) months between the middle of August 1994 and the middle of December 1994.

The period is so short that at least three parties of the drilling team may be required to be mobilized.

The Contractor shall submit detailed work schedule before commencement of the work for Engineer's approval.

3.3 Drilling Depth

The depth of the test well to be drilled ranges from 150 m (min.) to 250 m (max.), with an average depth 200 meters and 2,000 meters in total. The depth of each test well will be determined in accordance with the result of electrical resistivity sounding carried out by JICA Study Team, and be specified at least 2 weeks before mobilizations.

3.4 Drilling Diameter

In order to keep the annular space of more than 2 inches around the 8-inch casing/screen, the drill hole diameter shall be bigger than 12 inches.

3.5 Geophysical Logging

Prior to installation of casing and screen in the borehole, the following 3 types of logging shall be conducted in order to determine the most effective position of screen.

- Electrical resistivity logging
- Spontaneous potential logging
- Radio-active logging

3.6 Water Level Measurement

The static water level shall be accurately measured by use of water level indicator every day during the entire period of the drilling works. The two-times-a-day measurement is required, that is before starting the day's drilling work and right after finishing the day's work.

3.7 Soil/Rock Sample Collection

While drilling, the drill cuttings shall carefully be observed to prepare the geologic columnar section. The casing/screen program shall be mainly determined by this section which shall be supplemented with the

above logging data.

Soil sample shall be taken from the drill cuttings with progress of every five feet drilling, and shall be put in transparent vinyl bags where the hole No. and depth are written, and they shall be arranged in order.

3.8 Daily Drilling Record

The chief operator of every drilling team shall prepare the daily drilling record, which shall cover the items below, and submit it to the Engineer every weekend.

- Working hour and progress of the work
- Water level (morning and evening)
- Type of drill bit and drill collar used
- Bit rotation per minute
- Drilling speed (actual and the day's average)
- Description of soil/rock sample
- Troubles encountered and countermeasure taken

3.9 Casing/Screen Installation

Casing and screen shall be lowered into the drilled borehole in accordance with the casing program prepared by the Engineer.

Before lowering of them, the casing/screen shall be laid in order on the ground surface, which shall be marked with serial number from the bottom by the use of chalk.

When lowering, the centralizers shall be attached to every 6 casings or every 40 meters of the lined casing, so that the lined casing come to the center of the borehole.

A line of \varnothing 1" PVC perforated pipe shall be lowered together with the well casing to a depth of about 10 meters lower than the presumable dynamic water level, which will be used for water level monitoring.

3.10 Gravel and Sand Packing

The rounded gravel and coarse sand shall be packed into the annular space surrounding the screen/casing in order to elongate the life span of the well. The gravel packing shall be from the bottom to a level about 30 feet above the top of the screen, and the grain size of the gravel shall be 3 to 6 mm. After the gravel, the coarse sand of 1 to 2 mm grain shall be packed to a level about 15 feet lower than the ground surface.

3.11 Material for Casing and Screen and Length of Screen

The well casing shall be steel made with an inner diameter of 8 inches.

The two types of well screen are to be used. One is the stainless steel made and continuous slot by wedged wire wound (Johnson screen type or similar) with a slot size of less than 1 mm and with an opening ratio of more than 20%. Another is the steel made with a bridge type vertical slots having the total opening ratio of more than 6%.

The total length of the casing/screen is tentatively specified in the following table. The combination and proportion of the casing/screen of the individual well will likely be changed in accordance with the geological composition, however, the arrangement will be done within a limit of specified total length.

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Tentative casing program for 10 test wells

Well site (name of municipality)	Well depth (m)	Number/length of blind casing and screen					
		Johnson type screen		Bridge type screen		Blind casing	
		pcs	L(ft)	pcs	L(ft)	pcs	L(ft)
San José Pinula	160 (525')	5	50'	5	100'	19	380'
San Pedro Sacatepéquez	190 (624')	6	60'	4	80'	25	500'
Santa María de Jesús	180 (590')	7	70'	3	60'	23	460'
Sololá	200 (656')	3	30'	7	140'	25	500'
Momostenango	230 (754')	3	30'	7	140'	29	580'
San Fransisco la Unión	220 (722')	3	30'	7	140'	28	560'
(San Juan Comalapa)	200 (656')	5	50'	5	100'	26	520'
(San Martín Jilotepeque)	190 (623')	10	100'	-	-	27	540'
(Santa Lucía Utatlán)	230 (754')	3	30'	7	140'	30	600'
(Génova)	200 (656')	5	50'	5	100'	26	520'
Total	2,000 m (6560')	50	500'	50	1,000'	258	5160'

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3.12 Well Development and Preliminary Pumping Test

Well development shall be continued until water from the well turns apparently clean. Any type of development method such as bailing, air lifting/surging or by use of submersible motor pump can be selected. If mud was used during drilling, the development shall be continued for at least 10 hours after water turns clean in order to remove the mud from the hole wall completely.

At the end stage of well development/cleaning, the motor pump shall be used, and the pumping rate and approximate drawdown shall be measured for determination of the rate and duration of pumping test, that is the preliminary pumping test.

A considerable amount of water is expected to flow out during development and pumping test, therefore, drainage shall be properly arranged.

3.13 Pumping Test

The following three types of pumping test shall be carried out under the direction of the Engineer by use of the submersible motor pump and diesel engine generator.

- Step drawdown test

5 steps with 2 hours each pumping at the rates given by the Engineer

- Continuous drawdown tests

Pumping duration shall be 48 to 72 hours at the pumping rate directed by the Engineer, but the pumping can be terminated in earlier time when drawdown level comes stabilized.

- Recovery test

After continuous pumping, the recovery of the water level shall be measured for more than 8 hours, however, if the water level returns to the initial level at an earlier time, the measurement can be terminated.

3.14 Well Completion

The additional coarse sand shall be packed up to 5m below ground surface after finishing the pump test, then the annular space of about 5m long shall be sealed with cement. A round steel plate shall be point welded to the casing of each well as a temporary

cap. A concrete base with a dimension of 30cm H x 60cm W x 60cm L shall be constructed at the ground surface after surface sealing by cement grouting.

3.15 Well Fence Construction

The automatic water level gauges are to be installed at the 3 of the completed wells by the JICA Team. An anti-theft steel net fence shall be constructed by the Contractor in accordance with the following direction and as per illustrated in the attached drawing;

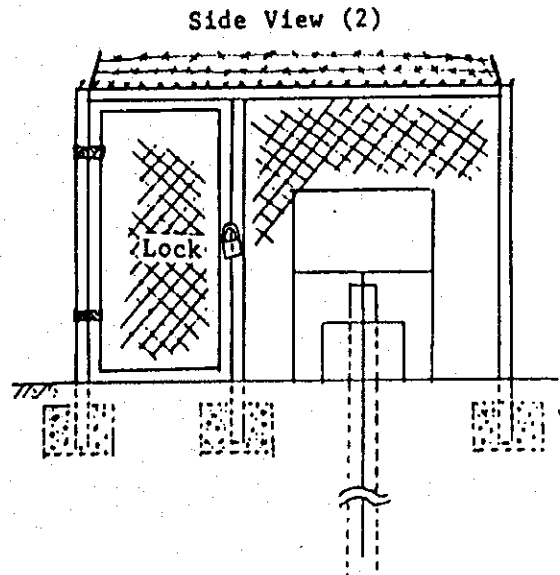
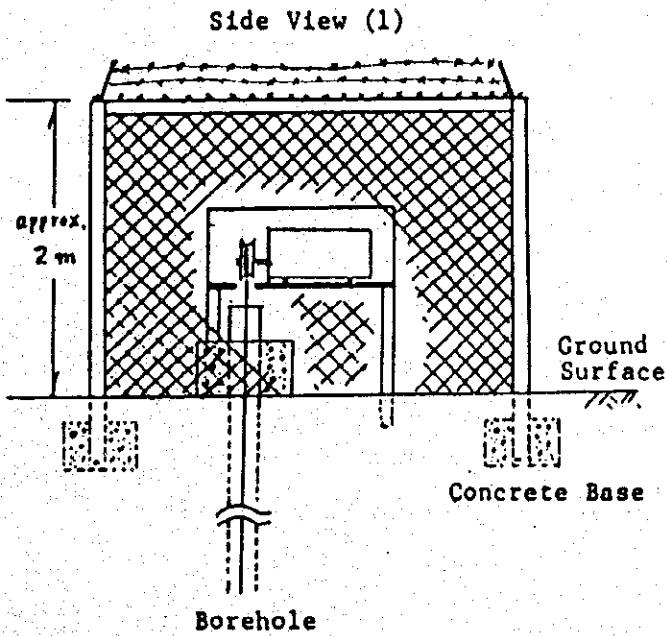
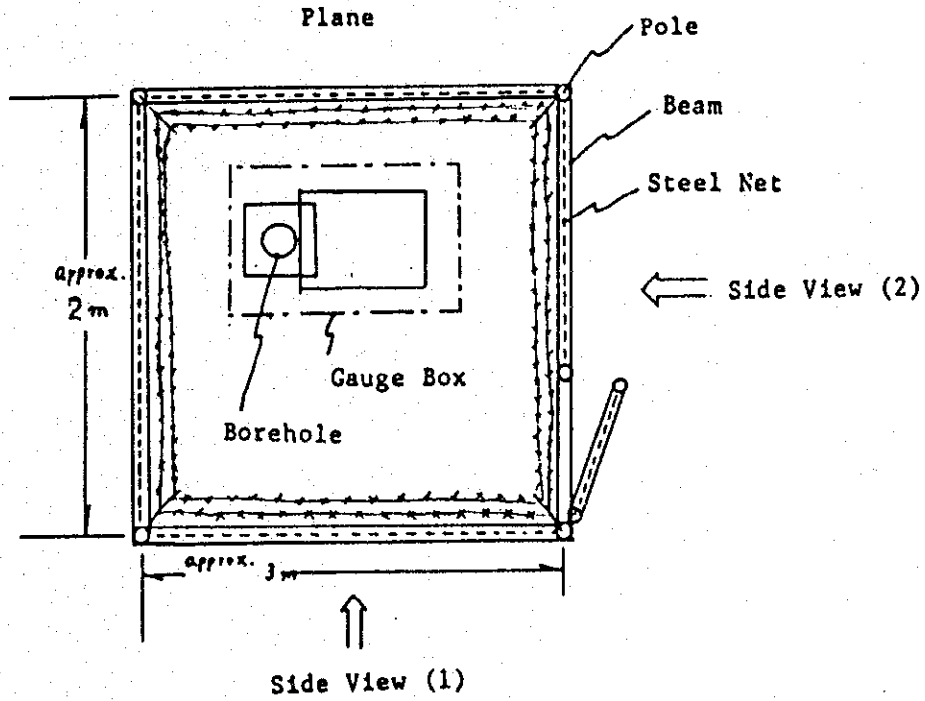
Dimensions: 2.0 mW x 2.0 mL x 2.0 mH

Material: -Steel pipe pole with concrete base
-Steel pipe beam
-Steel net

Attachment: -Door with a lock
-Barbed wire above the beam

Number: 3 places

SCHMATIC DESIGN OF WELL FENCE



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