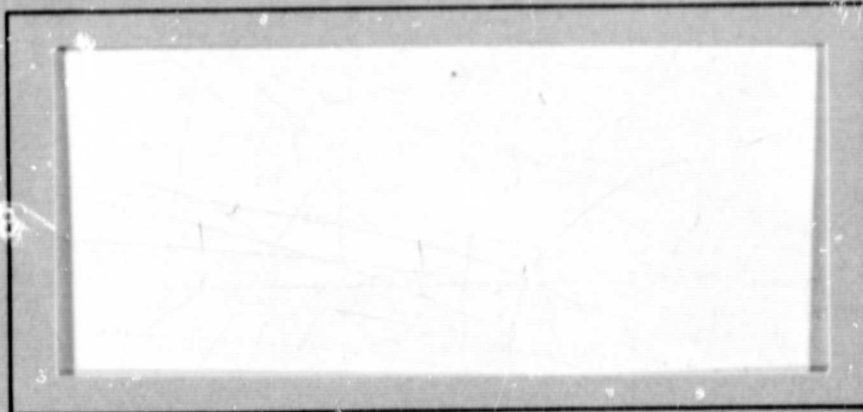


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Report

Final Report

"Soil Moisture Ground Truth Data
for Correlation with Microwave
Radiation Data"

Contract No. NAS5-21610

Prepared for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

Prepared by

BIOSPHERICS INCORPORATED
4928 Wyaconda Road
Rockville, Maryland 20853

April 14, 1971

BIOSPHERICS INCORPORATED

Convair 990 flights over the Imperial Valley and over the Phoenix, Arizona area were conducted on February 25, 1971 and March 1, 1971. In conjunction with these flights, Biospherics Incorporated conducted soil moisture samplings of various fields below the flight paths in each area for future correlation with microwave radiation temperatures.

PHOENIX, ARIZONA AREA

Soil moisture samples were taken with a 3-inch-wide tiling spade. Each sample was taken to a depth of 6 inches. Four samples were taken in each field. The initial sample was taken at least 50 yards from the edge of the field to avoid the edge effects of drying and irrigation. Three subsequent samples were taken at least 30 yards apart in a direction perpendicular to the direction of the flow of irrigation water on the field. The samples were taken to the laboratory, weighed on a top-loading Mettler balance (scale = 0.1 gram) and dried at approximately 105°C for 24 hours. The samples were then reweighed and the soil moisture calculated.

Two hundred fields were sampled on February 25, 1971 while 100 fields were sampled on March 1, 1971.

IMPERIAL VALLEY AREA

Soil moisture samples from 50 fields were taken with a 3/4-inch diameter Soil Test probe on February 25, 1971. Each sample was taken to a depth of 6 inches. The initial sample was taken at least 100 feet from the edge of the field to avoid edge effects. The remaining three samples in each field were taken along the flight path at intervals

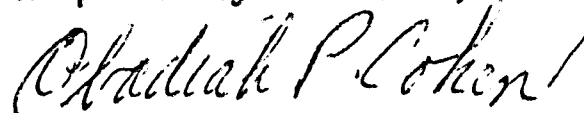
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approximating one-fourth of the field. Samples were then taken to the laboratory and a 100-gram sample of wet soil transferred to a drying pan. The sample was then dried and the soil moisture calculated. Weighings were made on a top-loading Ohaus balance (scale = 0.1 gram).

The calculated soil moistures are presented in Appendix A, while maps indicating the position of the sampled fields are presented in Appendix B.

Ten- to 15-pound samples of the major soil classifications in both the Phoenix, Arizona and Imperial Valley areas have been delivered to Goddard Space Flight Center.

Respectfully submitted,



Obadiah P. Cohen, Ph.D.
Principal Investigator

APPENDIX A

SOIL MOISTURE

PHOENIX, ARIZONA AREA

FEBRUARY 25, 1971

SOIL MOISTURE CONTENT IN FIELDS IN THE PHOENIX, ARIZONA AREA

-----PERCENT SOIL MOISTURE ON A DRY WEIGHT BASIS-----						
FIELD NO.	FIELD LOCATION	SAMPLE NO. 1	SAMPLE NO. 2	SAMPLE NO. 3	SAMPLE NO. 4	FIELD CONDITION
1	A3115cb	14.4	16.0	14.2	13.8	Bare
2	A3115cc	17.9	17.0	16.0	17.1	Bare
3	A3122bc	10.6	8.6	5.7	7.9	Disked after last crop - slight residue remaining on surface - few weeds - sample taken W to E.
4	A3122cd	9.3	10.0	8.0	11.0	Possibly be irrigated tomorrow
5	A3122cd	19.3	20.8	21.0	21.7	Bare
6	A3128ad	5.5	6.9	7.1	3.7	Floated
7	A3128da	7.3	4.8	4.9	6.5	Floated - may be furrowed out tomorrow.
8	A3128dd	6.9	5.3	5.1	5.1	Floated - may be furrowed out tomorrow.
9	A3128db	6.4	5.9	6.7	4.8	Could start pre-irrigation today or tomorrow.
10	A3127bd	4.2	4.6	6.1	7.9	Bare

SOIL MOISTURE CONTENT IN FIELDS IN THE PHOENIX, ARIZONA AREA

		-----PERCENT SOIL MOISTURE ON A DRY WEIGHT BASIS-----					
FIELD NO.	FIELD LOCATION	SAMPLE NO. 1	SAMPLE NO. 2	SAMPLE NO. 3	SAMPLE NO. 4	FIELD CONDITION	
11	A3133aa	15.4	15.3	14.3	16.0	Field Cap.	
12	A3133ad	13.7	13.7	13.8	12.4	Field Cap.	
13	A3133da	4.3	4.5	4.2	4.0	Extremely Cloddy	
14	A3133db	16.3	15.6	13.0	12.5	Bare	
15	A3133ac	5.0	5.7	6.7	9.6	Bare	
16	A3133bd	7.5	7.3	7.5	5.4	Fresh plowed - partly cloddy.	
17	A3133ba	8.6	6.7	5.6	6.0	Just been ripped	
18	A3133bb	-	-	-	-	Field Cap.	
19	A3133bc	5.8	3.8	5.0	6.3	Bare	
20	A3133cb	22.7	23.9	22.8	23.2	Bare	
21	A3133cc	24.4	21.2	20.2	19.7	Bare	
22	A3134bc	-	-	-	-	Field Cap.	
23	A2104bb	6.8	6.4	8.0	7.3	Floated	
24	A2104ba	21.2	21.8	21.1	21.2	Bare	
25	A2104bd	20.3	19.9	19.7	20.5	Bare	
26	A2104bc	4.5	5.5	4.7	8.4	W 20 rows wet - whole field may be be wet by flight.	

SOIL MOISTURE CONTENT IN FIELDS IN THE PHOENIX, ARIZONA AREA

		-----PERCENT SOIL MOISTURE ON A DRY WEIGHT BASIS-----					
FIELD NO.	FIELD LOCATION	SAMPLE NO. 1	SAMPLE NO. 2	SAMPLE NO. 3	SAMPLE NO. 4	FIELD CONDITION	
27	A2104cb	4.4	3.3	5.8	4.1	Furrowed out but extremely cloddy	
28	A2104ad	19.2	17.4	21.2	18.2	Bare	
29	A2103cb	5.1	4.1	5.5	4.6	Manure spread on field	
30	A2103cc	4.4	4.7	4.1	4.8	Field quite rocky	
31	A2109aa	6.2	7.1	6.5	8.9	Bare	
32	A2109ba	6.7	8.5	7.0	8.6	Just Floated	
33	A2109bb	14.1	12.7	14.3	13.2	Bare	
34	A2109bc	15.7	20.2	15.6	16.3	Bare	
35	A2109bd	5.9	6.0	5.8	5.8	Just Floated	
36	A2109cb	4.0	3.7	6.2	5.3	Bare	
37	A2109ca	18.1	16.0	20.7	18.4	Good Stand	
38	A2109dc	8.3	10.0	8.3	7.6	Bare	
39	A2110cc	4.0	5.2	5.3	4.8	Fresh plowed extremely cloddy	
40	A2110cd	7.3	8.5	8.4	9.2	Fresh plowed - extremely cloddy	
41	A2110ca	7.2	7.3	7.3	7.3	Fresh plowed - cloddy	

SOIL MOISTURE CONTENT IN FIELDS IN THE PHOENIX, ARIZONA AREA

FIELD NO.	FIELD LOCATION	-----PERCENT SOIL MOISTURE ON A DRY WEIGHT BASIS-----				FIELD CONDITION
		SAMPLE NO. 1	SAMPLE NO. 2	SAMPLE NO. 3	SAMPLE NO. 4	
42	A2116bb	14.0	13.6	15.2	15.9	Bare
43	A2116bc	13.7	13.7	14.0	12.7	Bare
44	A2116cb	-	-	-	-	Field Cap.
45	A2116cc	-	-	-	-	Field Cap.
46	A2116cd	20.2	18.9	18.6	18.5	Bare
47	A2116ad	7.8	8.3	10.3	8.3	Plowed - S.E. corner of field has been floated.
48	A2116db	7.2	7.5	7.0	6.1	Plowed - cloddy
49	A2116da	8.4	7.7	7.0	9.1	Fresh plowed - cloddy.
50	A2115cc	16.0	16.6	13.9	17.3	Bare
51	A2115cd	19.2	18.4	18.7	17.5	Bare
52	A2121ad	28.9	30.9	36.7	34.8	Bare
53	A2121ac	11.7	13.5	12.5	10.6	Bare
54	A2127ca	10.2	11.4	11.4	10.6	Bare
55	A2128da	25.3	26.6	25.5	26.3	Bare
56	A2128db	27.8	27.9	27.7	26.9	Bare
57	A2133bb	6.4	6.2	6.0	8.1	Bare

SOIL MOISTURE CONTENT IN FIELDS IN THE PHOENIX, ARIZONA AREA

-----PERCENT SOIL MOISTURE ON A DRY WEIGHT BASIS-----					FIELD CONDITION	
FIELD NO.	FIELD LOCATION	SAMPLE NO. 1	SAMPLE NO. 2	SAMPLE NO. 3	SAMPLE NO. 4	
58	A213bc	7.7	8.0	6.6	7.9	Bare
59	A2133ba	6.4	7.6	5.9	6.6	Bare
60	A2133bd	25.8	22.4	22.2	26.1	Bare
61	A2133ab	7.1	6.5	6.8	6.7	Bare
62	A2133ac	8.2	7.8	10.4	8.5	Bare
63	A2133db	30.1	29.4	24.6	26.7	Bare
64	A2133ad	5.6	6.5	6.5	6.9	Bare
65	A2133da	21.9	19.5	21.1	22.1	Bare
66	A2134bc	6.7	6.4	7.4	6.6	Bare
67	A2134bd	9.2	7.7	6.7	7.8	Roto Mulch
69	A2134cd	8.7	10.6	9.5	10.1	Bare
70	A2134cc	7.1	8.8	10.4	10.5	Bare
71	A1104db	17.9	15.6	19.2	14.1	Disk, some stubble
72	A1110bc	11.6	16.2	14.3	11.7	Bare
73	A1109da	18.6	21.3	20.9	19.3	Bare
74	A1109dd	18.7	18.1	17.8	18.5	Bare
75	A1116bb	33.7	29.5	31.3	31.0	Bare
76	A1116ba	28.7	28.3	29.0	28.3	Field is wet on top - above field capacity

SOIL MOISTURE CONTENT IN FIELDS IN THE PHOENIX, ARIZONA AREA

FIELD NO.	FIELD LOCATION	-----PERCENT SOIL MOISTURE ON A DRY WEIGHT BASIS-----			FIELD CONDITION
		SAMPLE NO. 1	SAMPLE NO. 2	SAMPLE NO. 3	
77	A1116ab	28.3	28.8	29.6	29.4
78	A1116aa	27.8	29.5	27.0	29.1
79	A1116cb	21.1	21.3	22.2	21.5
80	A1116dc	24.5	26.6	26.3	25.5
81	A1116cd	27.5	27.4	23.2	24.6
82	A1116cc	7.9	9.3	7.4	6.2
83	A1121bb	23.5	24.1	22.9	26.5
84	A1121ba	20.5	21.8	23.6	23.1
85	A1121at	24.4	24.1	25.4	26.7
86	A1121aa	17.5	19.3	19.2	17.1
87	A1122bb	5.7	6.5	6.1	7.4
88	A1122bc	7.2	7.2	5.3	5.7
89	A1121ad	18.6	16.7	17.3	17.6
90	A1121ca	26.1	26.6	26.4	23.9
91	A1121cb	5.5	6.5	4.4	4.6
92	A1121cc	4.4	4.3	4.8	3.9
					Has been land planed

Soil at field cap
Surface not wet

Moisture content
at field capacity,
surface is beginning
to dry, not muddy.

Partially dry on top
field cap.

SOIL MOISTURE CONTENT IN FIELDS IN THE PHOENIX, ARIZONA AREA

FIELD NO.	FIELD LOCATION	-----PERCENT SOIL MOISTURE ON A DRY WEIGHT BASIS-----				FIELD CONDITION
		SAMPLE NO. 1	SAMPLE NO. 2	SAMPLE NO. 3	SAMPLE NO. 4	
93	A1121cd	5.0	5.2	5.7	4.4	Bare
94	A1128ba	3.6	3.7	3.1	3.3	Heavy and light soil types running thru field
95	A1128bb	3.6	2.5	2.8	3.2	Heavy and light soil types running thru field
96	A1128bc	10.6	12.6	13.1	12.4	Bare
97	A1128db	20.8	22.4	22.2	20.3	Bare
98	A1128ca	26.2	25.9	24.2	25.6	Bare
99	A1128cd	6.3	7.3	7.5	6.3	Applying Manure
100	A1128dc	5.0	6.4	5.5	7.5	Just Plowed
104	D1206cb	3.6	3.4	3.6	3.8	Bare
105	D1206cc	3.3	3.9	3.1	3.0	Bare
106	D1207bb	3.5	3.3	3.4	3.1	Bare
107	D1206bd	4.6	3.7	4.0	4.4	Plowed, cotton stalk trash on top
108	D1207ba	3.2	4.2	3.3	3.5	Furrowed and cloddy.
109	D1207cd	3.1	3.0	3.5	3.4	Furrowed and cloddy
110	D1207ab	9.0	9.1	7.0	8.5	Bare
111	D1206aa	3.1	4.2	3.4	3.7	Plowed - disked - and cloddy

SOIL MOISTURE CONTENT IN FIELDS IN THE PHOENIX, ARIZONA AREA

		-----PERCENT SOIL MOISTURE ON A DRY WEIGHT BASIS-----					
FIELD NO.	FIELD LOCATION	SAMPLE NO. 1	SAMPLE NO. 2	SAMPLE NO. 3	SAMPLE NO. 4	FIELD CONDITION	
112	D1207aa	2.7	2.9	3.3	3.0	Furrowed and quite cloddy	
113	D1207ad	2.9	3.4	3.4	3.2	Furrowed and quite cloddy	
114	D1205bc	4.0	5.1	4.6	4.7	Plowed - disked	
115	D1205cb	7.5	5.2	6.2	6.2	Disked with a lot of maize stubble showing	
116	D1205cc	7.2	5.8	4.8	5.1	Furrowed out	
117	D1208bb	10.6	10.2	10.1	9.7	Bare	
118	D1205ca	6.0	5.2	6.1	6.6	Plowed and disked before last week's rain	
119	D1205cd	6.0	6.6	4.9	5.0	Plowed and disked before rain last week.	
120	D1205dc	14.0	14.2	15.1	15.2	Bare	
121	D1205dd	6.1	4.8	6.6	6.0	Plowed, cloddy	
122	D1204cb	5.3	3.7	2.5	4.1	Plowed, good tilth	
124	D1204ca	7.3	10.9	7.5	8.0	Plowed, good tilth	
123	D1204cc	5.6	5.5	6.0	5.0	Plowed, very cloddy	
125	D1204cd	6.1	7.8	10.7	7.4	Plowed and disked since rain	

SOIL MOISTURE CONTENT IN FIELDS IN THE PHOENIX, ARIZONA AREA

		-----PERCENT SOIL MOISTURE ON A DRY WEIGHT BASIS-----				
FIELD NO.	FIELD LOCATION	SAMPLE NO. 1	SAMPLE NO. 2	SAMPLE NO. 3	SAMPLE NO. 4	FIELD CONDITION
126	D1209ab	5.1	5.0	5.1	8.6	Plowed and disked before rain last week
127	D1209ac	4.8	5.9	5.6	10.3	Disked since rain
128	D1209aa	5.8	5.8	4.0	4.9	Plowed and disked before rain
129	D1209ad	9.9	10.1	11.0	8.8	Bare
130	D1203bb	5.0	5.5	4.6	4.6	Floated before rain
131	D1203bc	5.1	6.1	5.9	6.0	Floated before rain
132	D1210bb	7.1	8.6	6.4	6.9	Rough plowed before rain
133	D1210bc	4.3	3.7	5.5	3.3	Furrowed out on W side of field before rain, approx. 150' furrowed before the rest of field after rain
134	D1203ba	6.4	6.4	6.4	4.7	Disked and furrowed
135	D1203bd	5.1	6.2	4.4	3.3	Disked before rain
135A	D1203ca	8.9	10.3	9.6	9.8	Soil surface mostly covered by crop
136	D1210ba	4.8	5.0	4.7	4.8	Plowed before rain
137	D1210bd	3.3	5.1	7.1	4.8	Samples taken on top of bed. Beds are flat on top, not peaked

SOIL MOISTURE CONTENT IN FIELDS IN THE PHOENIX, ARIZONA AREA

-----PERCENT SOIL MOISTURE ON A DRY WEIGHT BASIS-----						
FIELD NO.	FIELD LOCATION	SAMPLE NO. 1	SAMPLE NO. 2	SAMPLE NO. 3	SAMPLE NO. 4	FIELD CONDITION
138	D1203ab	3.5	5.5	6.0	5.2	Has been plowed and disked, but very cloddy - big clods
139	D1203ac	5.3	3.7	6.1	4.4	Disked since rain. The E. 1/2 of field has been listed. Samples taken on W. side.
140	D1203db	10.7	12.1	8.5	7.3	Disked since rain.
141	D1203dc	6.2	7.0	6.0	5.8	Disked since rain.
142	D1203ad	7.8	7.8	7.6	8.6	Bare
143	D1203da	5.5	4.5	5.1	3.2	Disked since rain.
144	D1203dd	5.7	6.5	5.8	6.2	Plowed before rain
145	D1201bb	5.7	5.0	4.8	5.3	Disked now with droq behind
146	D1201cb	5.4	4.9	4.5	3.3	Being listed, should be complete soon.
147	D1201bc	11.5	12.7	13.0	10.3	Bare
148	D1201ba	4.3	5.7	4.8	5.3	Plowed - disked before rain. Cot. in field now, should be diseed again by 2-24
149	D1201bd	4.4	3.9	5.0	6.2	Samples taken E. side floated.

SOIL MOISTURE CONTENT IN FIELDS IN THE PHOENIX, ARIZONA AREA

-----PERCENT SOIL MOISTURE ON A DRY WEIGHT BASIS-----						
FIELD NO.	FIELD LOCATION	SAMPLE NO. 1	SAMPLE NO. 2	SAMPLE NO. 3	SAMPLE NO. 4	FIELD CONDITION
150	D1201db	4.4	4.4	4.9	4.6	Plowed - very cloddy land planed
151	D1306bc	3.5	6.8	5.0	3.9	Plowed - land planed cloddy.
152	D1306bb	4.4	3.5	6.7	SPIILLED	Plowed - land planed, cloddy.
153	D1306cb	4.7	4.9	4.7	5.2	Plowed - land planed and cloddy.
154	D1306ca	6.3	4.1	5.8	5.6	Plowed, land planed, cloddy
155	D1404ab	1.7	1.8	1.7	1.6	Cloddy
156	D1404ac	3.0	5.0	3.3	2.0	Bare
157	D1404aa	10.6	7.9	9.0	8.0	Bare
158	D1404db	6.3	6.8	6.5	6.7	Bare
159	D1404dd	9.0	8.1	7.7	6.9	Bare
160	D1404dc	2.6	3.6	3.1	3.3	Bare
161	D1409aa	2.0	1.8	1.9	1.8	Bare
163	D1410ab	5.5	5.1	4.5	5.9	Bare
164	D1410ab	5.5	5.1	4.5	5.9	Bare
164	D1410ac	4.4	5.4	4.5	4.2	Bare

SOIL MOISTURE CONTENT IN FIELDS IN THE PHOENIX, ARIZONA AREA

		-----PERCENT SOIL MOISTURE ON A DRY WEIGHT BASIS-----					
FIELD NO.	FIELD LOCATION	SAMPLE NO. 1	SAMPLE NO. 2	SAMPLE NO. 3	SAMPLE NO. 4	FIELD CONDITION	
165	D1410aa	4.5	5.4	3.6	5.1	Bare	
166	D1410ad	5.0	3.8	5.0	4.9	Bare	
167	D1411cc	9.5	10.8	9.4	11.3	Bare	
168	D1402ca	10.8	12.2	12.0	11.8	Bare	
169	D1402cb	15.7	13.0	15.1	16.4	Bare	
170	D1403ad	6.4	6.8	8.4	11.2	Bare	
171	D1403da	23.1	22.8	17.7	19.8	Bare	
172	D1411bb	19.1	20.4	18.0	19.0	Bare	
173	D1505ca	8.2	9.8	11.0	10.6	Bare	
174	D1505cd	7.4	9.0	8.7	8.4	Bare	
175	D1504bc	7.6	9.9	7.6	8.2	Bare	
176	D1504bb	7.6	8.5	7.6	7.2	Bare	
177	D1503ba	8.7	7.4	7.0	6.4	Bare	
178	D1503bd	5.9	5.7	7.6	8.4	Bare	
179	D1503ad	20.0	18.5	18.6	18.2	Surface just barely dried out. Not quite F.C.	

SOIL MOISTURE CONTENT IN FIELDS IN THE PHOENIX, ARIZONA AREA

		-----PERCENT SOIL MOISTURE ON A DRY WEIGHT BASIS-----						
FIELD NO.	FIELD LOCATION	SAMPLE NO. 1	SAMPLE NO. 2	SAMPLE NO. 3	SAMPLE NO. 4	FIELD CONDITION		
180	D1502cb	4.8	4.9	5.1	5.7	Very cloddy		
181	D1503da	19.7	20.9	20.1	19.8	Surface dry, just below field capacity		
182	D1503db	21.4	23.0	22.3	21.8	Surface dried out		
183	D1503dc	18.6	18.8	21.4	21.1	Surface dry		
184	D1503bb	22.7	23.6	23.9	24.0	Surface dry		
185	D1510ab	22.7	23.7	24.0	21.8	Surface dry		
186	D1510aa	22.6	24.8	24.1	24.3	Surface just barely dried out		
187	D1510ad	24.3	23.1	24.8	23.3	Surface just barely dried out		
188	D1511bb	20.8	20.9	23.8	22.0	Surface still slightly wet		
189	D1511ba	3.8	4.1	4.5	4.0	Bare		
190	D1511bc	21.2	23.1	25.1	25.3	Surface slightly wet		
191	D1511bd	2.7	3.0	3.8	3.1	Bare		
192	D1511ac	5.1	5.4	5.0	5.2	Bare		
193	D1511ab	5.8	6.4	4.4	5.5	Bare		
194	D1511aa	9.1	7.5	7.7	7.0	Bare		
195	D1511ad	5.4	4.3	5.2	5.4	Bare		

SOIL MOISTURE CONTENT IN FIELDS IN THE PHOENIX, ARIZONA AREA

FIELD NO.	FIELD LOCATION	PERCENT SOIL MOISTURE ON A DRY WEIGHT BASIS				FIELD CONDITION
		SAMPLE NO. 1	SAMPLE NO. 2	SAMPLE NO. 3	SAMPLE NO. 4	
180	D1502cb	4.8	4.9	5.1	5.7	Very cloddy
181	D1503da	19.7	20.9	20.1	19.8	Surface dry, just below field capacity
182	D1503db	21.4	23.0	22.3	21.8	Surface dried out
183	D1503dc	18.6	18.8	21.4	21.1	Surface dry
184	D1503bb	22.7	23.6	23.9	24.0	Surface dry
185	D1510ab	22.7	23.7	24.0	21.8	Surface dry
186	D1510aa	22.6	24.8	24.1	24.3	Surface just barely dried out
187	D1510ad	24.3	23.1	24.8	23.3	Surface just barely dried out
188	D1511bb	20.8	20.9	23.8	22.0	Surface still slightly wet
189	D1511ba	3.8	4.1	4.5	4.0	Bare
190	D1511bc	21.2	23.1	25.1	25.3	Surface slightly wet
191	D1511bd	2.7	3.0	3.8	3.1	Bare
192	D1511ac	5.1	5.4	5.0	5.2	Bare
193	D1511ab	5.8	6.4	4.4	5.5	Bare
194	D1511aa	9.1	7.5	7.7	7.0	Bare
195	D1511ad	5.4	4.3	5.2	5.4	Bare

SOIL MOISTURE CONTENT IN FIELDS IN THE PHOENIX, ARIZONA AREA

FIELD NO.	FIELD LOCATION	-----PERCENT SOIL MOISTURE ON A DRY WEIGHT BASIS-----				FIELD CONDITION
		SAMPLE NO. 1	SAMPLE NO. 2	SAMPLE NO. 3	SAMPLE NO. 4	
196	D1512ad	10.3	9.5	7.3	8.7	Bare
197	D1512aa	8.9	8.3	8.0	8.2	Bare
198	D1606cb	7.5	7.8	8.0	8.2	Smooth
199	D1606bb	9.3	8.4	6.5	9.2	Cloddy - plowed
200	D1607ba	5.0	7.6	6.7	5.2	Bare
201	D1606dc	9.4	9.8	8.6	7.1	Bare
202	D1606dd	7.0	7.2	9.1	8.0	Plowed, disked and leveled - small clods
203	D1607aa	8.4	9.0	9.6	9.6	Leveled and smooth
204	D1607ad	5.9	5.9	8.6	6.3	Smooth surface
205	D1606da	23.4	23.0	20.5	22.3	Bare

IMPERIAL VALLEY, CALIFORNIA AREA

FEBRUARY 25, 1971

SOIL MOISTURE CONTENT IN FIELDS IN THE IMPERIAL VALLEY AREA

SOIL MOISTURE ON A DRY WEIGHT BASIS-----

<u>FIELD NO.</u>	<u>FIELD LOCATION</u>	<u>SAMPLE NO. 1</u>	<u>SAMPLE NO. 2</u>	<u>SAMPLE NO. 3</u>	<u>SAMPLE NO. 4</u>	<u>FIELD CONDITION</u>
1		2.6	2.3	3.1	3.3	West section is bare, not cultivated, east in light brush.
2		23.3	21.8	22.1	21.5	Alfalfa, approx. 12" high.
3		36.4	35.1	34.4	35.5	Bare, planted in cotton (water in field).
4		38.5	37.0	36.1	36.4	Bare, planted in cotton.
5		35.9	35.5	37.4	35.7	Bare.
6		33.2	31.1	28.9	30.2	Bare, planted in cotton.
7		5.5	4.2	3.5	4.5	Bare, not cultivated (Calipatria Airfield)
8		5.0	7.3	7.0	6.6	Bare, not cultivated (Calipatria Airfield)
9		22.1	21.2	21.5	20.9	Bare, planted in cotton.
10		17.8	19.6	20.3	19.8	Bare, planted in cotton.
11		6.6	7.6	8.2	7.3	Bare, cultivated.
12		3.8	5.8	8.2	6.8	Bare, cultivated.
13		11.5	10.6	11.0	11.1	Bare, cultivated.

SOIL MOISTURE CONTENT IN FIELDS IN THE IMPERIAL VALLEY AREA

SOIL MOISTURE ON A DRY WEIGHT BASIS-----

<u>FIELD NO.</u>	<u>FIELD LOCATION</u>	<u>SAMPLE NO. 1</u>	<u>SAMPLE NO. 2</u>	<u>SAMPLE NO. 3</u>	<u>SAMPLE NO. 4</u>	<u>FIELD CONDITION</u>
14		12.4	11.7	12.0	10.7	Bare, cultivated.
15		25.3	21.1	20.6	22.9	Sugar beets, approx. 18-24" high.
16		14.5	14.9	12.7	13.4	Bare, cultivated.
17		14.2	13.6	13.9	13.1	Bare, cultivated.
18		26.1	24.8	24.2	24.5	Old lettuce, not cultivated.
19		21.5	22.0	24.5	23.0	Old lettuce, not cultivated.
20		25.3	24.2	24.5	23.8	
21		22.5	23.5	25.5	24.4	Bare, planted in cotton.
22		32.3	31.2	31.0	31.6	Bare, planted in melons (water in field
23		30.9	30.2	33.3	32.1	Bare, planted in melons.
24		8.7	8.1	7.4	7.5	Bare, cultivated.
25		27.2	28.2	29.5	29.9	Brush (sparse) area, with bare alkali sections
26		33.0	32.6	33.3	33.7	Bare, planted in cotton.
27		34.2	35.5	37.9	37.0	Bare, planted in cotton.

SOIL MOISTURE CONTENT IN FIELDS IN THE IMPERIAL VALLEY AREA

FIELD NO.	SOIL MOISTURE ON A DRY WEIGHT BASIS-----				FIELD LOCATION	FIELD CONDITION
	SAMPLE NO. 1	SAMPLE NO. 2	SAMPLE NO. 3	SAMPLE NO. 4		
28	30.4	30.0	33.0	33.7		Bare, planted in cotton.
29	27.9	28.2	27.4	27.1		Bare, planted in cotton.
30	29.9	29.2	25.9	27.7		Alfalfa, approx. 3-5" high.
31	8.5	8.9	21.7	19.0		East section in dry pasture, west is bare, cultivated.
32	20.2	18.2	17.5	19.3		Bare, alkali.
33	26.9	24.4	20.2	17.2		East section in irrigated pasture, west is bare with alkali.
34	8.6	9.3	11.1	8.3		Dry pasture.
35	16.7	14.9	11.1	11.7		Barley, approx. 8-10" high.
36	5.6	6.6	6.0	6.4		Bare, cultivated, fallow.
37	6.4	5.3	5.5	5.7		Bare, cultivated, fallow.
38	19.8	22.0	24.7	25.3		Bare, cultivated.
39	14.2	14.4	13.1	13.8		Bare, cultivated.

· SOIL MOISTURE CONTENT IN FIELDS IN THE IMPERIAL VALLEY AREA

FIELD NO.	SOIL MOISTURE ON A DRY WEIGHT BASIS-----				FIELD LOCATION	FIELD CONDITION
	SAMPLE NO. 1	SAMPLE NO. 2	SAMPLE NO. 3	SAMPLE NO. 4		
40	22.9	22.0	20.8	22.1		Young barley, sparse at the east end of field.
41	24.7	26.6	27.9	26.0		Young barley, sparse.
42	22.4	22.7	19.8	20.9		Bare, planted in melons.
43	19.2	20.5	21.7	20.8		Young barley, sparse.
44	13.6	13.0	11.9	12.6		Alfalfa, approx. 12" high.
45	27.6	27.2	28.2	27.7		Bare, planted in cotton.
46	25.8	26.4	24.4	25.0		Bare, planted in cotton.
47	30.2	31.6	31.9	30.9		Bare, cultivated.
48	24.1	25.8	24.5	23.5		Bare, cultivated.
49	17.6	19.3	20.2	18.9		Bare, cultivating in process (A.M.).
50	13.3	17.4	19.5	18.5		Young barley, sparse.

PHOENIX, ARIZONA AREA

MARCH 1, 1971

SOIL MOISTURE CONTENT IN FIELDS IN THE PHOENIX, ARIZONA AREA

FIELD NO.	FIELD LOCATION	-----PERCENT SOIL MOISTURE ON A DRY WEIGHT BASIS-----			FIELD CONDITION
		SAMPLE NO. 1	SAMPLE NO. 2	SAMPLE NO. 3	
1	A3115cb	14.9	16.5	19.1	16.5 Bare
2	A3115cc	12.0	15.6	12.8	15.9 Bare
3	A3122bd	8.1	7.1	8.5	7.3 Few Weeds
4	A3122cc	17.6	16.9	15.3	15.1 Bare
6	A3128ad	5.2	4.3	3.6	4.0 Bare
7	A3128	13.7	14.8	15.9	14.4 Bare
8	A3128dd	2.8	4.7	3.5	3.9 Irrigating Today N. Part of Field Wet
9	A3128db	4.9	4.4	5.1	3.8 Bare
11	A3133aa	13.0	11.5	14.1	12.1 Bare
12	A3133ad	9.7	12.7	10.8	10.5 Bare
13	A3133da	4.3	3.9	4.5	3.8 Bare
14	A3133db	15.1	12.9	14.7	12.8 Bare
23	2104bb	6.4	8.5	6.0	5.0 Floated
24	A2104ba	18.2	18.7	20.2	16.3 Bare
25	A2104bd	16.4	16.2	16.8	17.9 Bare
28	A2104ad	15.7	19.0	17.8	16.5 Bare
30	A2103	18.4	17.8	17.6	19.5 Bare
31	A2109aa	5.6	5.4	6.4	6.0 Floated

SOIL MOISTURE CONTENT IN FIELDS IN THE PHOENIX, ARIZONA AREA

		-----PERCENT SOIL MOISTURE ON A DRY WEIGHT BASIS-----					
FIELD NO.	FIELD LOCATION	SAMPLE NO. 1	SAMPLE NO. 2	SAMPLE NO. 3	SAMPLE NO. 4	FIELD CONDITION	
38	A2109dc	26.0	21.0	18.9	20.1	Bare	
39	A2100cc	4.6	4.5	4.7	3.7	Plowed - extremely cloddy	
44	A2116cb	27.0	26.1	27.2	26.1	Near F.E.	
48	A2116db	6.1	4.7	6.1	6.7	Plowed - very cloddy	
49	A2116da	6.6	8.4	5.5	6.4	Plowed - very cloddy	
50	A2115cc	29.3	32.5	35.0	31.6	Bare	
51	A2115cd	13.2	14.4	12.8	15.2	Bare	
53	A2121ac	29.1	29.1	28.5	29.8	Bare	
55	A2128ad	24.0	23.1	23.9	23.6	Bare	
59	A2133ba	6.4	7.1	6.2	6.5	Bare	
60	A2133bd	24.2	24.6	26.7	23.9	Bare	
64	A2133ad	5.9	7.6	7.3	6.1	Bare	
65	A2133da	22.5	22.6	22.1	22.3	Bare	
66	A2134bc	7.2	6.9	6.9	7.5	Bare	
68	A2134ca	5.2	7.4	5.9	6.8	Bare	
71	A1104db	17.0	17.2	17.8	16.0	Bare	
72	A1110bc	13.1	7.6	7.8	10.5	Bare	
74	A119da	17.5	17.0	15.2	17.5	Bare	

SOIL MOISTURE CONTENT IN FIELDS IN THE PHOENIX, ARIZONA AREA

		-----PERCENT SOIL MOISTURE ON A DRY WEIGHT BASIS-----				
FIELD NO.	FIELD LOCATION	SAMPLE NO. 1	SAMPLE NO. 2	SAMPLE NO. 3	SAMPLE NO. 4	FIELD CONDITION
76	A1116ca		<u>SPIILLED</u>			
78	A1116aa	19.5	19.4	20.7	21.1	Bare
80	A1116dc	22.9	23.9	22.7	22.9	Bare
81	A1116cd	22.3	22.9	20.7	23.3	Bare
82	A1116cc	22.9	23.3	24.4	22.8	Bare
83	A1121bb	19.4	19.2	18.5	17.9	Bare
84	A1121ba	17.2	17.4	17.7	19.3	Bare
86	A1121aa		<u>SPIILLED</u>			
87	A1122bb		<u>SPIILLED</u>			
92	A1121cc	4.3	3.5	4.2	4.4	Bare
94	A1128ba		<u>SPIILLED</u>			
95	A1128bb	4.7	4.1	4.6	4.4	Bare
96	A1128bc	7.8	7.7	7.4	7.8	Bare
105	D1206cc	3.5	2.7	3.3	3.1	Bare
106	D1207bb	3.6	4.8	4.2	4.4	Water had not yet reached area sampled.
107	D1206cd	3.3	3.7	3.1	4.0	Plowed, same as before with cotton with cotton stalk tras
108	D1207ba	2.0	2.2	2.5	3.3	Bare

SOIL MOISTURE CONTENT IN FIELDS IN THE PHOENIX, ARIZONA AREA

		-----PERCENT SOIL MOISTURE ON A DRY WEIGHT BASIS-----						
FIELD NO.	FIELD LOCATION	SAMPLE NO. 1	SAMPLE NO. 2	SAMPLE NO. 3	SAMPLE NO. 4	FIELD CONDITION		
109	D1207bd	2.4	3.1	2.5	2.5	Furrowed and Cloddy		
112	D1207aa	3.8	3.7	3.3	6.7	Furrowed and quite cloddy.		
120	D1205dc	23.1	24.8	22.5	19.6	Bare		
121	D1205dd	9.8	10.4	9.5	10.9	Plowed and Cloddy		
122	D1204cb	4.6	3.8	4.2	3.8	Rough Plowed		
124	D1204ca	5.4	6.1	6.6	6.4	Fresh Diseed		
128	F1209aa	4.8	4.4	5.0	4.0	Bare		
129	D1209ad	9.4	12.9	12.1	11.3	Safflower		
132	D1210bb	5.1	5.2	4.2	3.6	Rough plowed before rain.		
133	D1210bc	5.8	3.8	3.2	3.4	Part planted before rain - best after, but not irrigated		
135A	D1203ca	8.5	7.4	6.0	7.4	Bare		
140	D1203db	6.9	8.9	4.9	6.8	Land planed (fresh)		
141	D1203dc	4.1	4.4	4.6	4.0	Disked since rain.		
142	D1203ad	12.8	11.1	10.5	11.1	Finished irrigation at field cap (*check prior pertinent data.		
143	D1203da	4.2	4.4	3.7	3.2	Freshly land planed		

SOIL MOISTURE CONTENT IN FIELDS IN THE PHOENIX, ARIZONA AREA

FIELD NO.	FIELD LOCATION	-----PERCENT SOIL MOISTURE ON A DRY WEIGHT BASIS-----				FIELD CONDITION
		SAMPLE NO. 1	SAMPLE NO. 2	SAMPLE NO. 3	SAMPLE NO. 4	
146	D1201cb	4.7	4.7	5.2	3.8	Bare
147	D 201bc	18.7	17.5	18.0	12.5	This field irrigated since flight. Field is at capacity or just over.
149	D1201bd	4.9	6.6	3.7	3.8	Completely listed since flight.
152	D1306bb	3.1	3.3	3.0	3.4	Plowed land, planed and cloddy.
153	D1306cb	3.4	5.4	4.3	4.1	Plowed land, planed and cloddy.
154	D1306ca	3.1	3.7	4.4	3.6	Plowed land, planed and cloddy.
156	D1404ac	1.5	1.4	1.6	1.6	Cloddy
159	D1404dd	6.0	3.6	3.7	5.6	Bare
160	D1404dc	1.8	1.5	1.7	1.4	Furrowed out since last sampling.
163	D1410ab	3.7	3.7	4.3	4.7	Slightly cloddy.
165	D1410aa	3.1	3.3	3.0	3.4	Bare
167	D1411bb	10.1	11.1	10.7	10.1	No work in field since rainfall.
168	D1402cb	12.1	10.9	11.2	11.1	Bare
171	D1403da	17.7	17.6	18-1	19.1	Bare

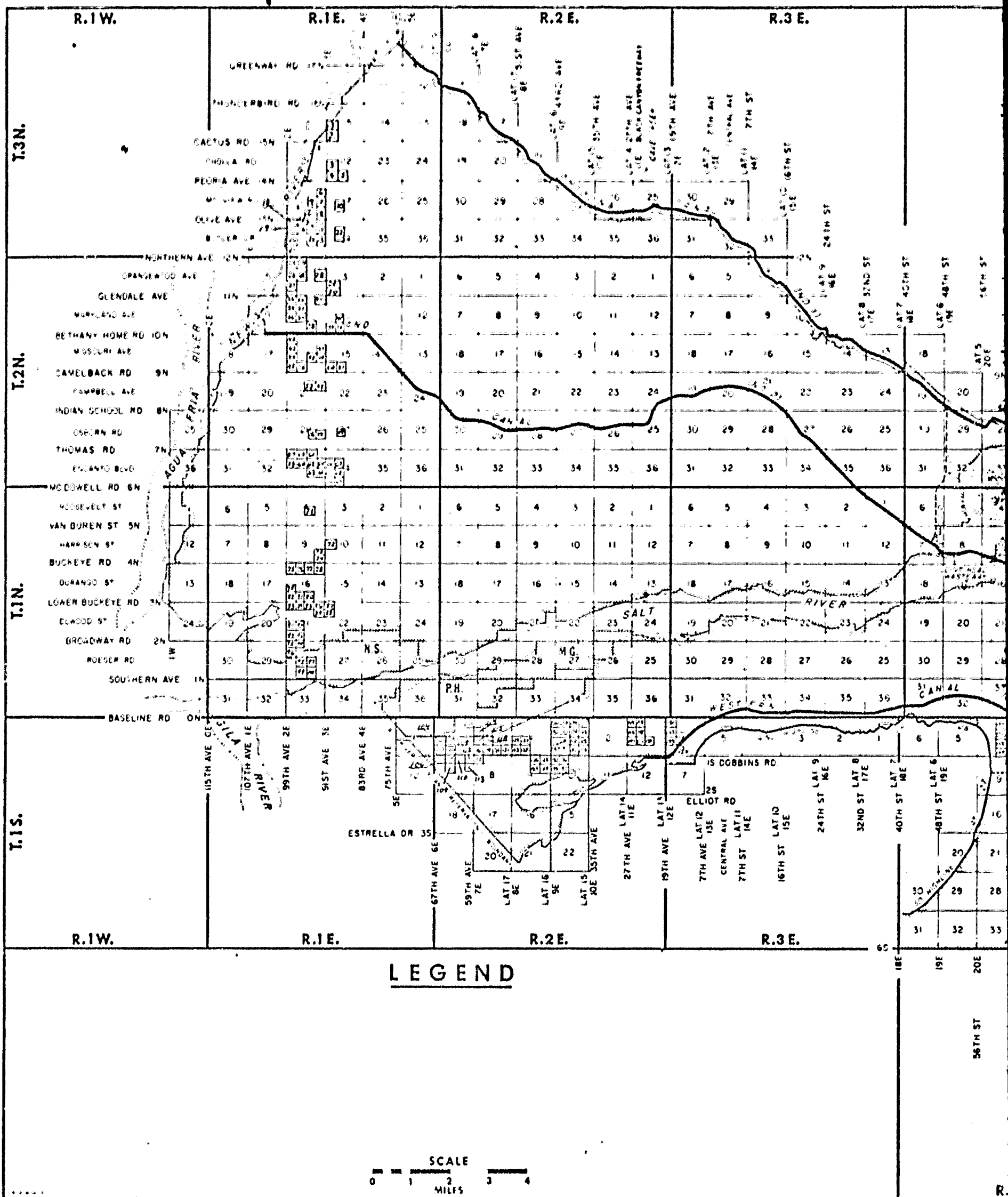
SOIL MOISTURE CONTENT IN FIELDS IN THE PHOENIX, ARIZONA AREA

-----PERCENT SOIL MOISTURE ON A DRY WEIGHT BASIS-----						
FIELD NO.	FIELD LOCATION	SAMPLE NO. 1	SAMPLE NO. 2	SAMPLE NO. 3	SAMPLE NO. 4	FIELD CONDITION
173	D1505ca	8.4	7.6	9.0	8.8	Bare
176	D1504bb	4.3	5.7	6.2	4.9	Furrowed since last sample.
178	D1503bd	7.9	7.0	7.9	5.5	Bare
181	D1503da	16.5	14.3	14.2	14.7	Bare
183	D1503dc	13.6	12.6	14.2	15.3	Dry Surface.
185	D1510ab	15.5	15.8	14.7	14.0	Bare
186	D1510aa	16.8	20.0	18.7	16.0	Bare
189	D1511ba	3.3	3.5	3.2	3.2	Bare
191	D1511bd	3.0	3.4	3.4	3.4	Bare
192	D1511ac	3.2	3.0	3.3	3.1	Bare
195	D1511ad	2.8	2.6	3.2	2.8	Bare
197	D1512aa	4.6	4.5	5.2	5.6	Slightly Cloddy
198	D1606cb	3.0	4.1	3.7	4.1	Very Smooth
200	D1607ba	3.2	3.4	3.7	1.8	Cloddy
202	D1606dd	4.1	4.0	3.5	4.2	Bare
203	D1607aa	4.7	4.6	5.5	3.4	Bare
205	D1606da	16.1	16.5	17.9	14.2	Surface Dry

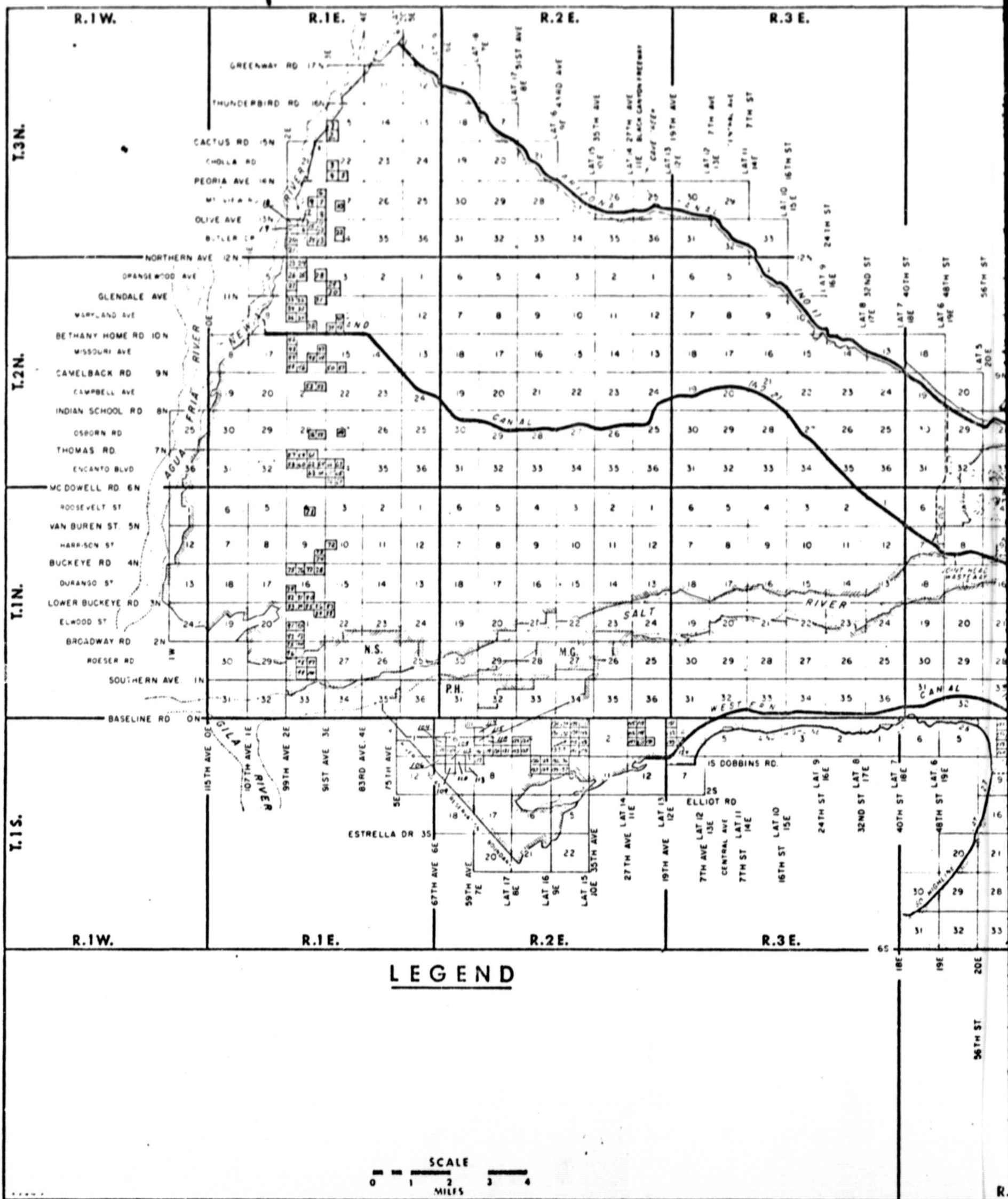
APPENDIX B
MAPS OF SAMPLED FIELDS

PHOENIX, ARIZONA AREA

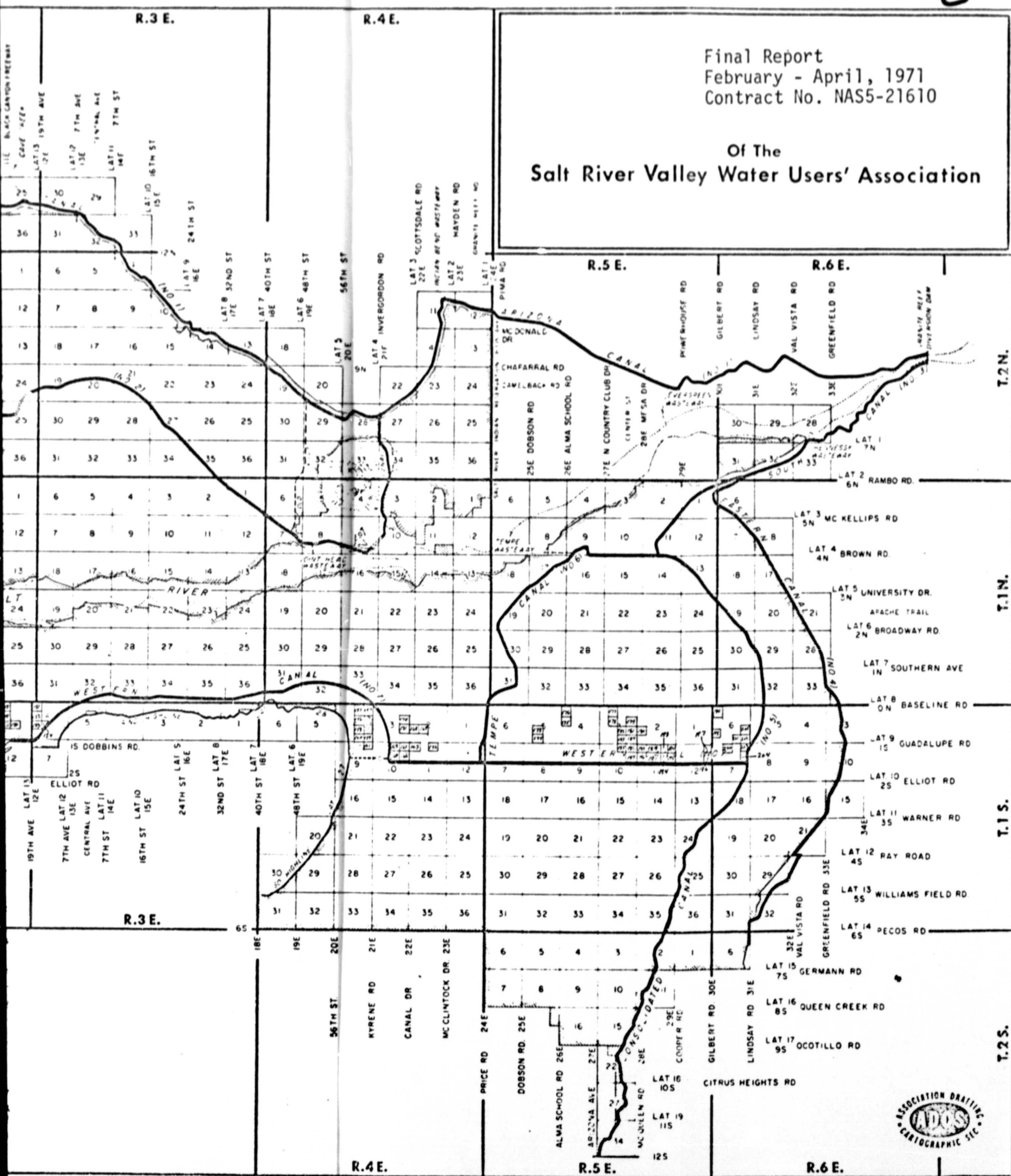
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FOLDOUT FRAME



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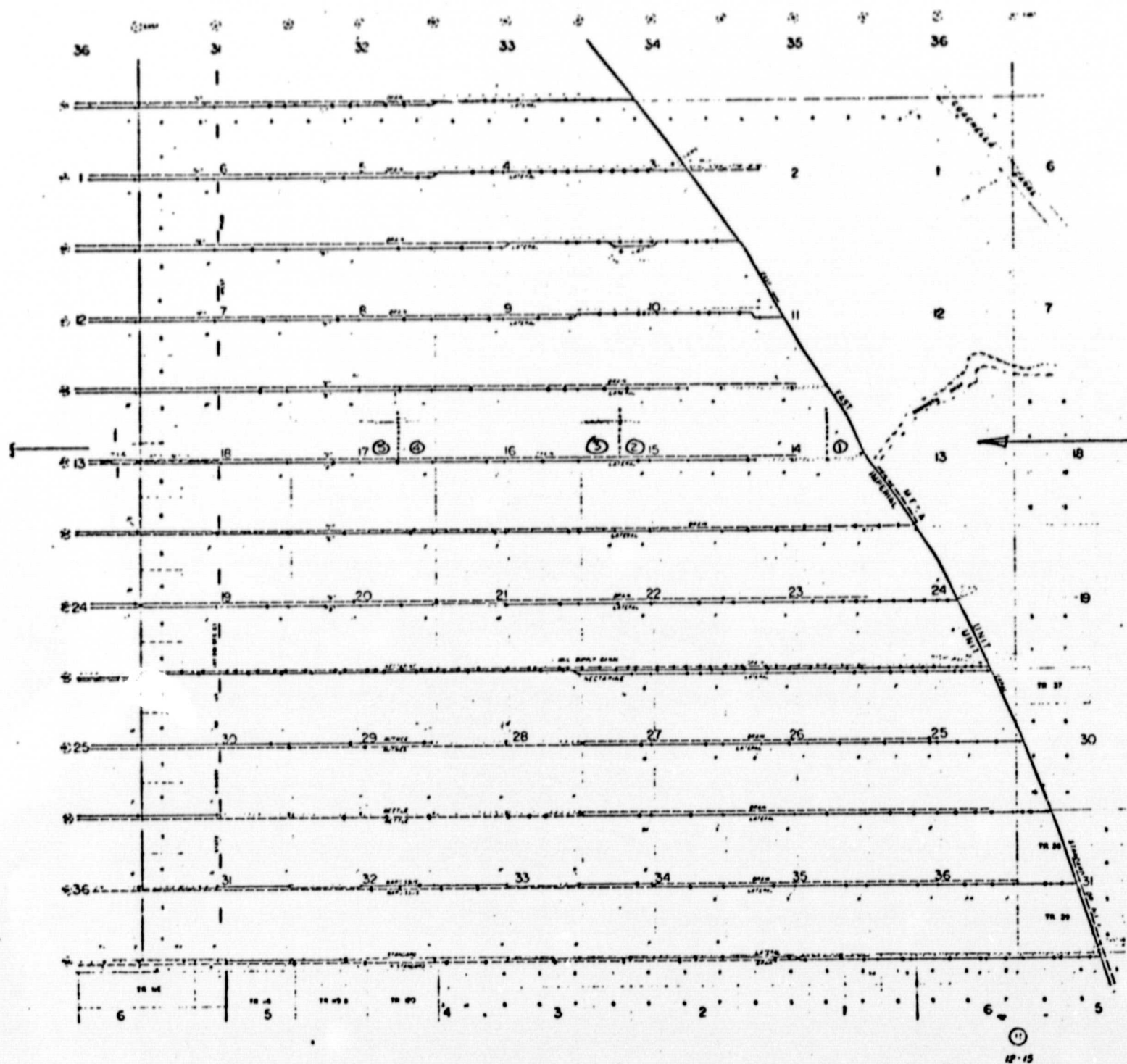


IMPERIAL VALLEY, CALIFORNIA AREA

IMPERIAL VALLEY, CALIFORNIA AREA

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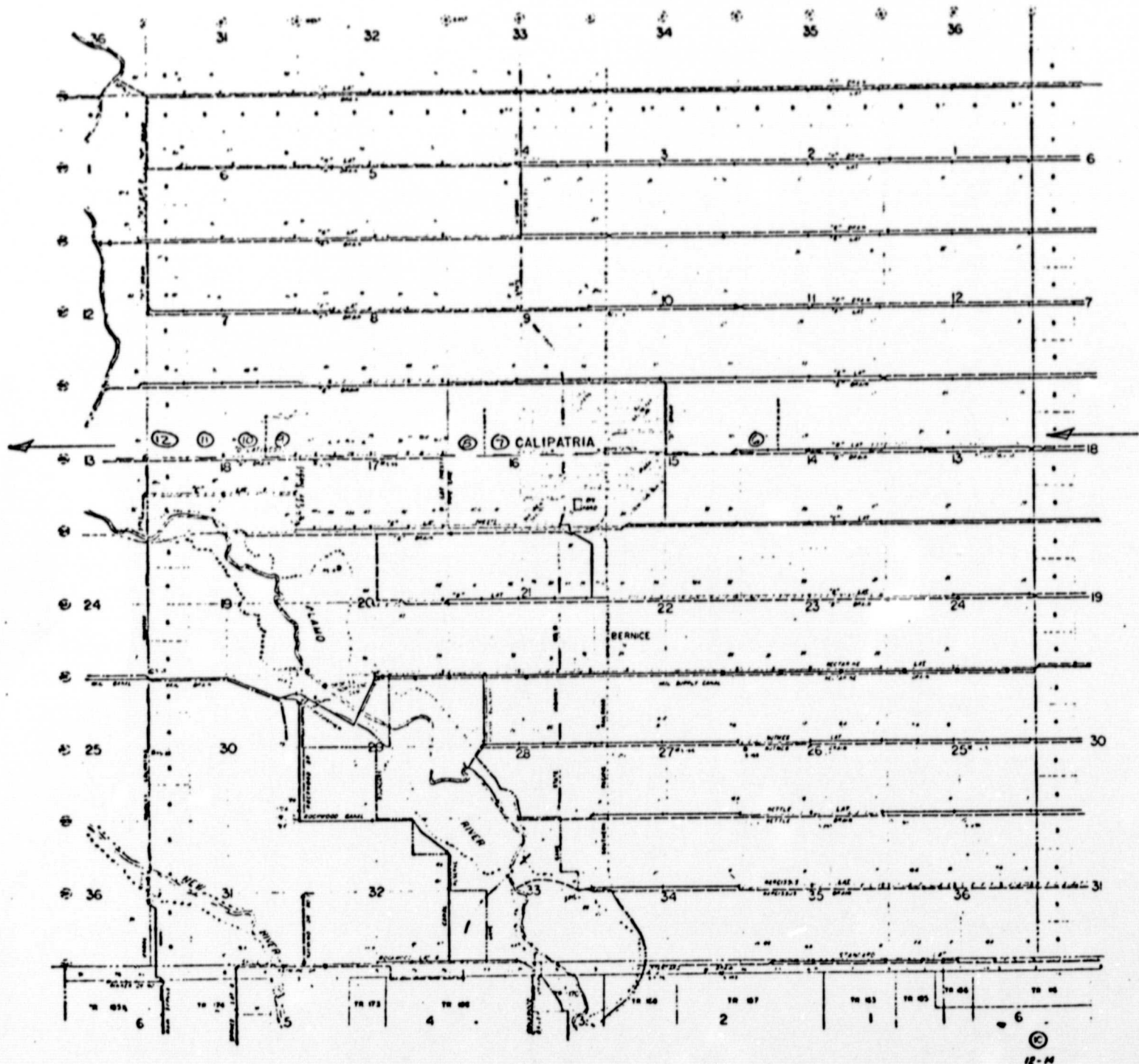
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NORTH (CALIPATRIA) E-W ROUTE

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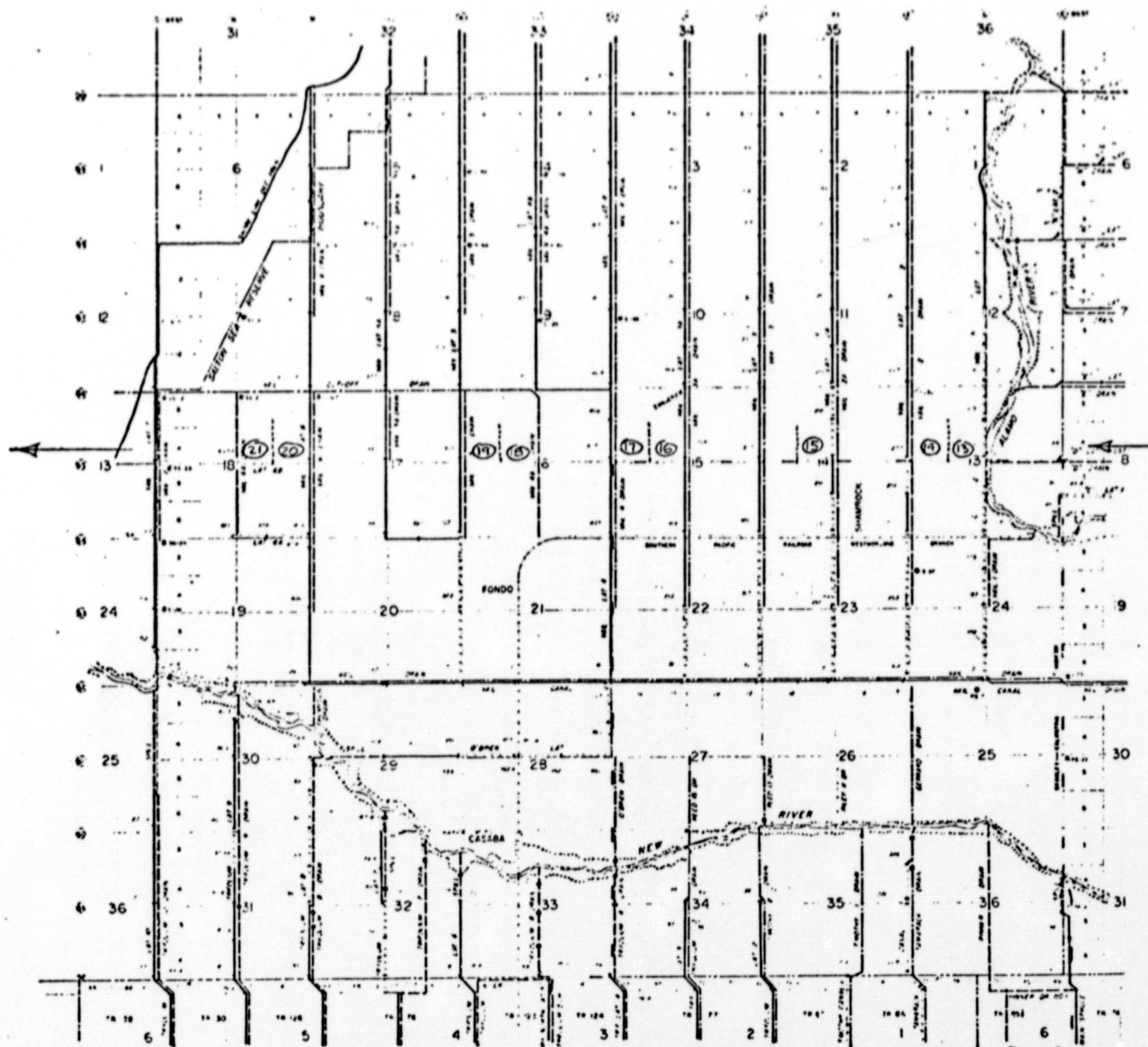


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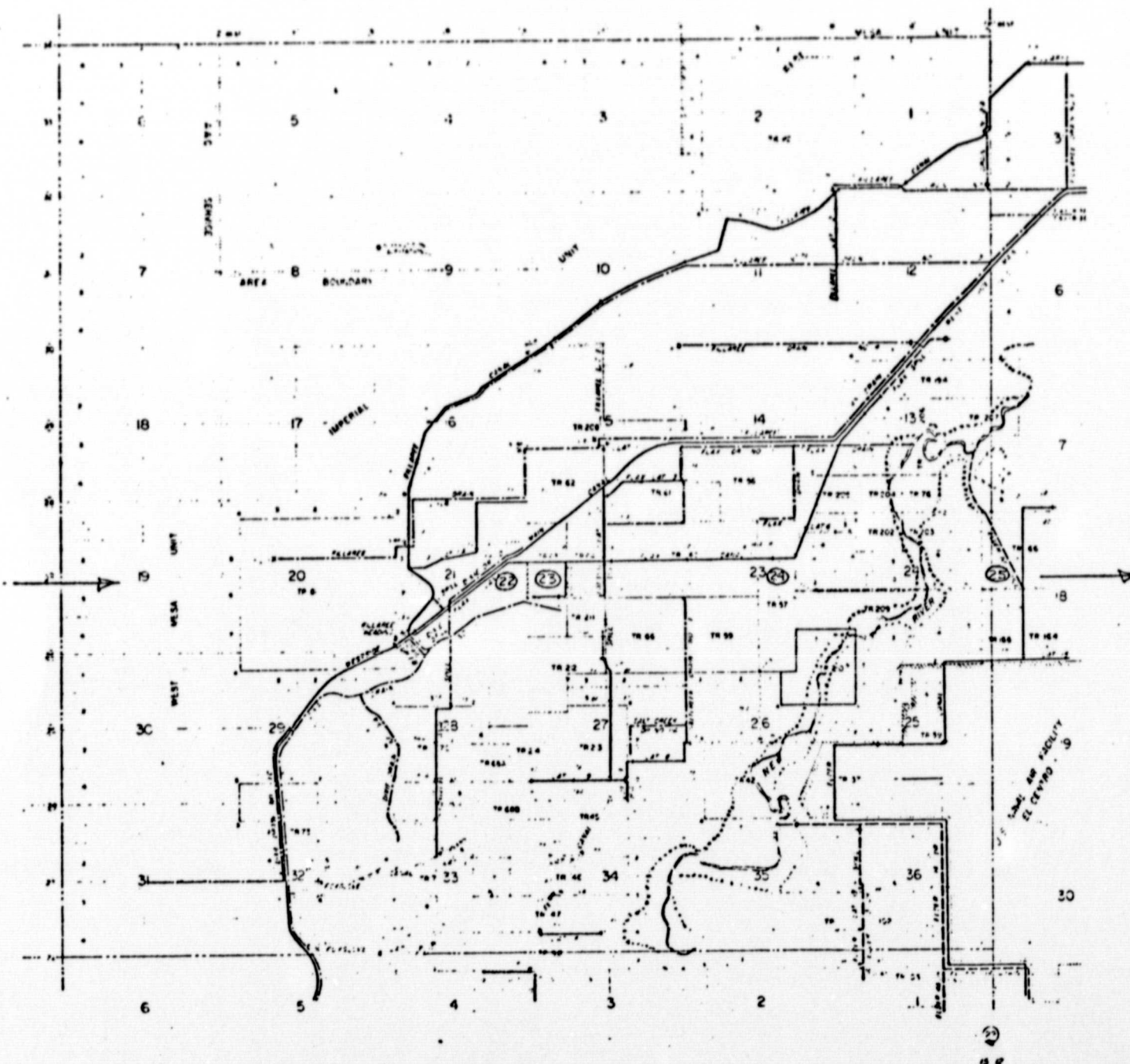
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SOUTH (IMPERIAL) E-W ROUTE

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SOUTH (IMPERIAL) E-W ROUTE

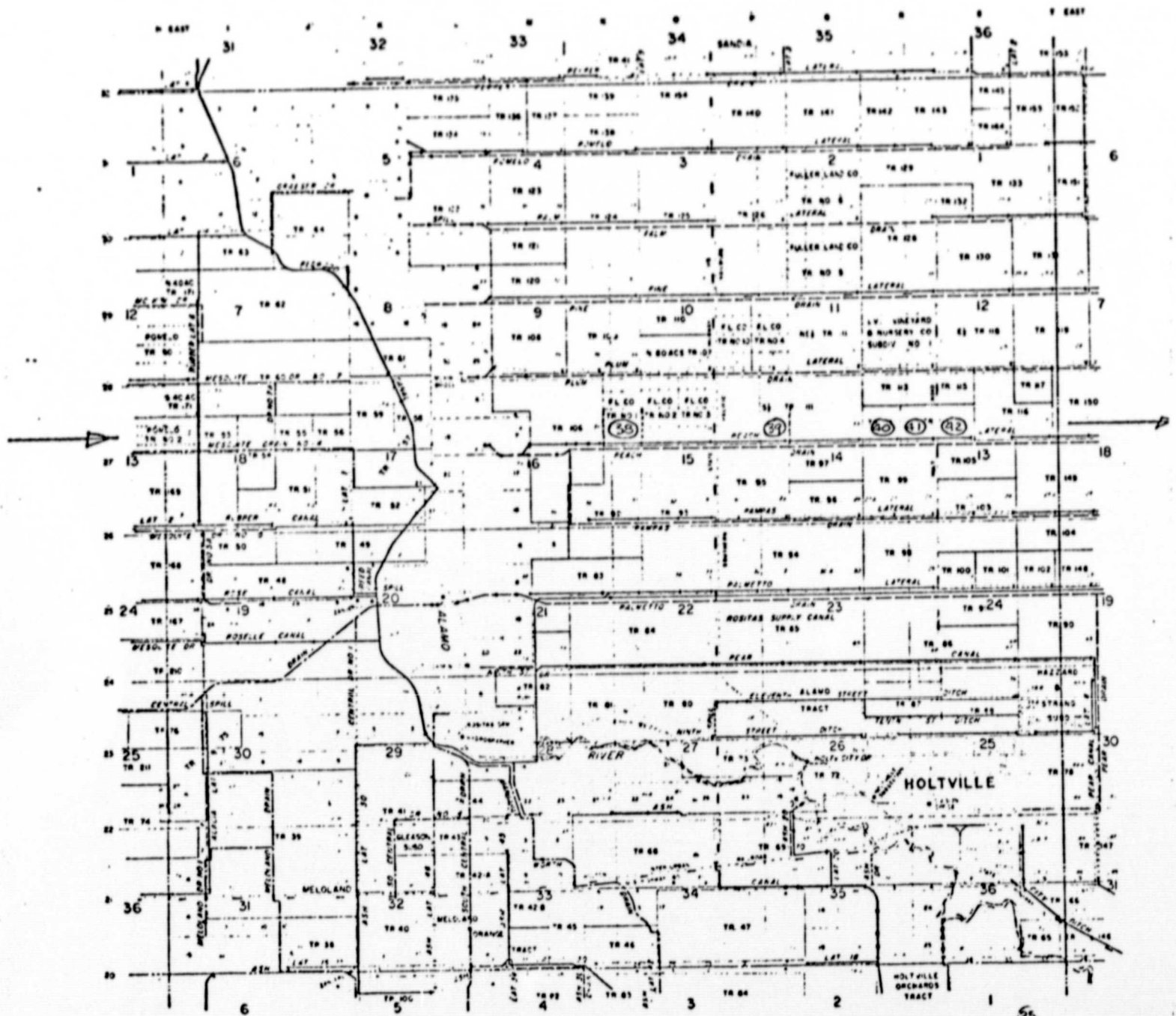
This is a detailed cadastral map of Imperial and El Centro, California. The map shows a grid of land parcels, many of which are numbered (e.g., 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36). The map includes labels for 'IMPERIAL' and 'EL CENTRO'. It also shows various roads, railroads, and waterways. The map is oriented with North at the top. The title 'IMPERIAL' is located in the upper left, and 'EL CENTRO' is located in the lower left. The map is a black and white reproduction of a historical document.

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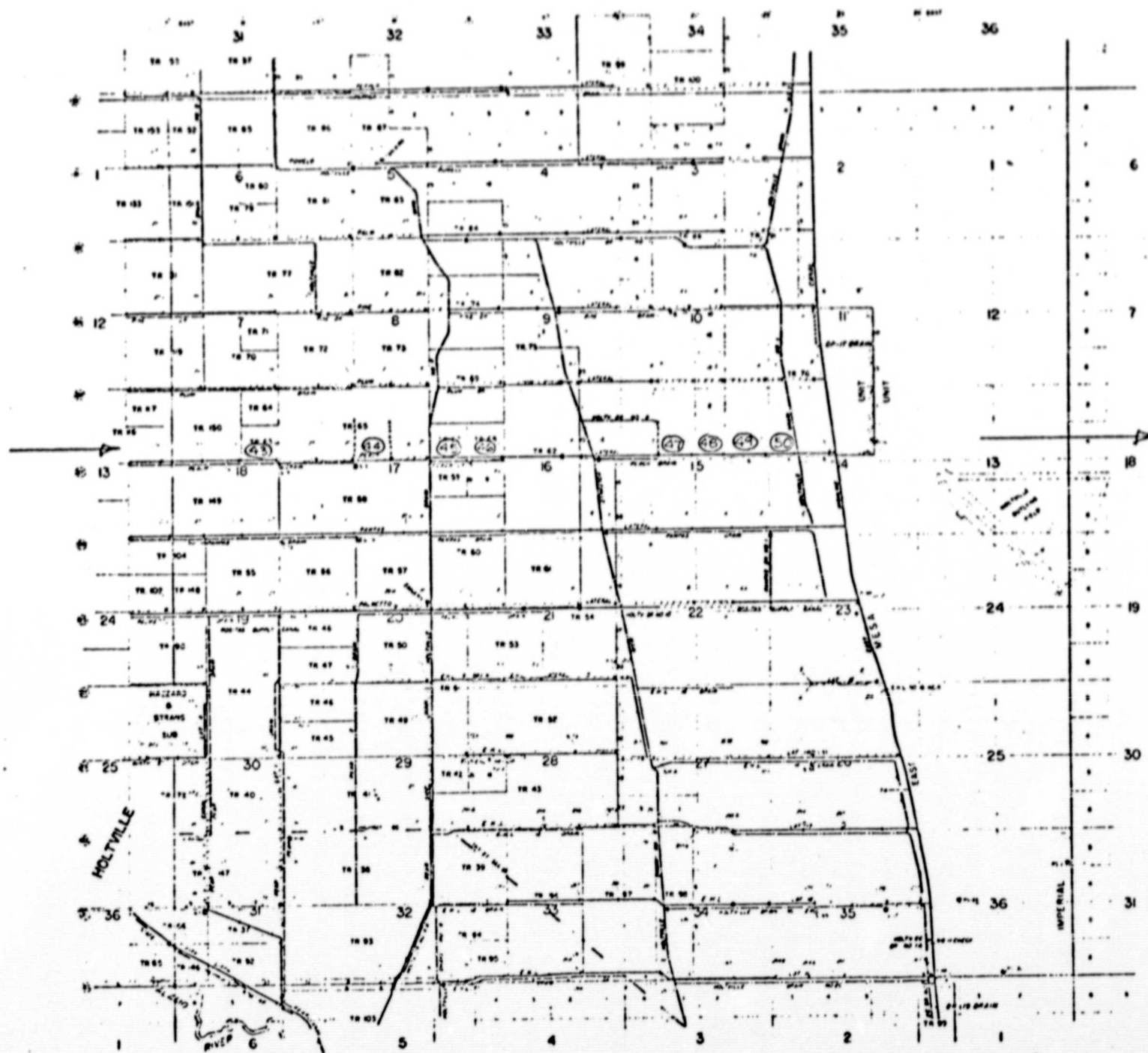
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