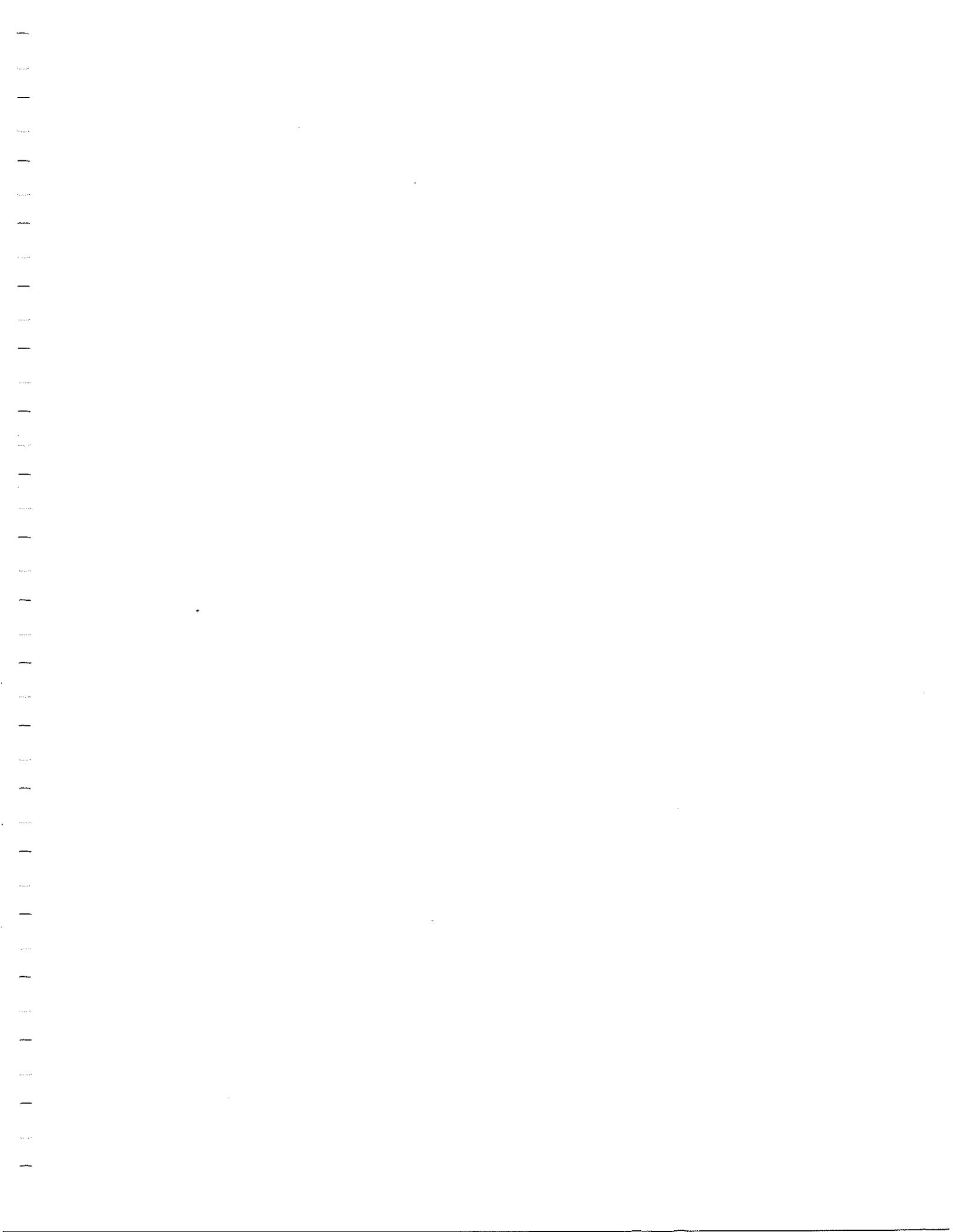


SASKATCHEWAN WATER CORPORATION

GEOLOGY OF THE WEST SIDE IRRIGATION
PROJECT

Report 0114-001 December 6, 1986



E. A. Christiansen Consulting Ltd.

CONSULTING GEOLOGIST

BOX 3087
SASKATOON, SASKATCHEWAN, CANADA
S7K 3S9

PHONE 374-6700

December 5th, 1986

Saskatchewan Water Corporation
Attention: Dr. W.A. Meneley
W.A. Meneley Consultants Ltd.
Box 7167
Saskatoon, Saskatchewan
S7K 4J1

Dear Dr. Meneley:

Enclosed are two copies of Report 0114-001 on the "Geology of the west side irrigation project, Saskatchewan". The report includes a map (Drawing 0114-001-01), 12 cross sections (Drawing 0114-001-02 to 13), and an index of logs. In addition to showing the location of cross sections, the map shows the areal extent of the Dalmeny, Fielding, Forestry Farm, and Tessier aquifers. Available wells and groundwater analyses were placed on the cross sections to show the general subsurface drainage. The contact between the Lea Park and Judith River Formations was selected as the base of exploration for this study (Drawings 0114-001-02 to 13).

In the study area, sediments above the base of exploration include bedrock and glacial deposits. Bedrock is composed of Judith River and Bearpaw Formations. The Judith River Formation is an aquifer in the northern part of the study area, whereas the Ardkenneth Member of the Bearpaw Formation is the main bedrock aquifer in the southern part.

Because of the presence of shallower aquifers in the southern part of the study area, the deeper Judith River Formation has not been penetrated by wells. Except in down-faulted areas, the Ardkenneth Formation is missing in the northern part of the study area. In most of the study area, the heads in bedrock aquifers are below surface and act as drains. Locally, in valleys (South Saskatchewan River, Anerley, and Eagle Creek) and depressions (Goose and Rice Lakes), however, heads in the Judith River Formation are above surface resulting in poorly drained, saline soils.

Overlying bedrock in ascending order are Empress, Sutherland, and Saskatoon Groups. The Empress Group includes both preglacial and glacial gravels, sands, and silts. These sediments occur between bedrock and till. The Tyner Valley aquifer (Drawing 0114-001-01) is in the Empress Group and is potentially the most productive aquifer in the study area. Except for depressions in the Grandora (30-36-07-W3) and Barber Lake (07-28-12-W3) areas, heads in the Tyner Valley aquifer are below surface.

The Sutherland Group is composed of two tills separated by an intertill sand and gravel aquifer. This aquifer is well developed in the Conquest area (T.30, R.10), where its head is about 150 feet below surface (Drawing 0114-001-12, log 407, well 504).

Dalmeny, Fielding, Forestry Farm, and Tessier aquifers (Drawing 0114-00k-01) occur in or at the base of the Saskatoon Group. The boundaries of these aquifers, for the most part, are gradational with the surrounding sandy till. This till may contain shoestrings of sand such as in the Conquest area (T.30, R.10). Where valleys (Eagle Creek) cut into aquifers (Tessier), drainage readily occurs (T.33, R.11). Shoestring sands, on the other hand, because of their limited extent, are poor conductors at groundwater; consequently, the surface is poorly drained and locally saline.

Surficial, deltaic sands are common in the study area and extensive areas have been reworked into dunes. Aquifers occur in these sands which grade downward into silt.

Sincerely yours,

A circular professional seal for E.A. Christiansen, a Professional Engineer in Saskatoon, Saskatchewan. The seal contains the text "PROFESSIONAL ENGINEER" around the top inner edge, "E. A. Christiansen" in the center, "SASKATOON" below the name, and "SASKATCHEWAN" around the bottom inner edge.

E.A. Christiansen, P.Eng.

EAC/wan
Enclosures

INDEX OF LOGS, WEST SIDE IRRIGATION PROJECT

NO.	NAME	LOCATION (R3)	SURFACE ELEV. (ft.)	DEPTH WELL (ft.)	SCREEN LENGTH (ft.)	STATIC LEVEL (ft.)	EC MS/CM	CI PPM	SAR	GEOLOGY	AQUIFER	LAB
36	SRC Saskatoon	SW 11-26-36-05	1,665									
37	SRC Saskatoon	NE 16-23-36-05	1,715									
38	MIDAS STH 13	SW 04-13-36-05	1,673.2									
39	FFIB Haight Bros.	NW 12-04-36-04	1,690	205	13	42	3.2	394	23	Bedrock	Ardkenneth	SRC
40	U of S Goodale Farm 1	NE 02-04-36-04	1,671									
41	U of S Goodale Farm 8	SE 16-33-35-04	1,663									
42	SRC Reshow Lake	SE 16-03-40-14	2,380									
43	Heath-Paige 1	16-03-40-14	2,384									
44	Chevron N. Biggar	4-20-39-13	2,375									
45	CEEPPE Riley Lake	03-04-39-13	2,372									
46	FFIB Menzies, R.	01-36-38-13	2,200	175	5.3	70				Sutherland		
47	SOHIO Red Cr. Arelee 4	15-05-38-12	1,980									
48	FFIB Pauloff, J.	NW 06-02-38-12	1,860									
49	FFIB Melashenko, E.	NW 13-31-37-11	1,830	293	10					Bedrock	Judith River	
50	SOHIO Red Cr. Arelee 1	04-29-37-11	1,980									
51	FFIB Elian, S.	SE 16-21-37-11	1,820	310	10	95				Bedrock	Judith River	
52	FFIB Young, D.	SE 04-13-37-11	1,775	157	10	50						
53	GSC Kinley 2	SW 01-12-37-11	1,778	297	3					Sutherland Bedrock	Judith River	
54	SRC Enliron	SE 16-04-37-10	1,750									
55	GSC Kinley 1	SW 02-02-37-10	1,657	157	5					Bedrock	Judith River	
56	Com. Urban	NW 13-30-36-09	1,730									
57	McGowan, J.R.	SE 01-17-36-09	1,750	30		26	4.4	593	1	Surficial		SRC
58	Sulphur Asquith	04-16-36-09	1,749									
59	FFIB Sammach, M.	NE 01-09-36-09	1,760	100	15	25				Floral		
60	FFIB Gregory, K.G.	NW 04-02-36-09	1,750									
61	CMS Eagle	04-36-35-09	1,744									
62	Com. Vanscoy	SW 04-29-35-08	1,660									
63	CMS Vanscoy	04-28-35-08	1,639									
64	Com. Vanscoy	SE 16-21-35-08	1,650	49		11	2.0	82	3	Floral		SRC
65	CMS Vanscoy	04-22-35-08	1,648									
66	Com. Vanscoy	NE 16-15-35-08	1,680									
67	Com. Vanscoy	SW 12-14-35-08	1,680	292	12	14	3.1	267	18	Empress	Tyner Valley	

INDEX OF LOGS, WEST SIDE IRRIGATION PROJECT

NO.	NAME	LOCATION (W3)	SURFACE ELEV. (ft)	DEPTH WELL (ft)	SCREEN LENGTH (ft)	STATIC LEVEL (ft)	EC mS/cm	CI PPM	SAR	GEOLOGY	AQUIFER	LAB
68	Com. Vanscoy	NE 07-14-35-08	1,680									
69	Com. Vanscoy	NE 16-11-35-08	1,690			25.4	0.6	7	0	Surficial		SRC
70	Shillington, V.N.	SE-05-12-35-08	1,725	33		19	0.7	4	1	Surficial		SRC
71	Stushnoff, P.	NW 05-05-35-07	1,725	72		20	0.8	39	1	Surficial		SRC
72	Sparrow, M.	NW 13-28-34-07	1,725	26								
73	SRC Pike Lake	NE 09-21-34-07	1,750									
74	Ward, T.C.	SW 12-22-34-07	1,725	30		28	0.6	4	0	Surficial		SRC
75	SRC Pike Lake	SE 03-18-34-06	1,720									
76	SRC Pike Lake	SW 01-17-34-06	1,590									
77	SRC Pike Lake	SW 04-15-34-06	1,590									
78	SRC Pike Lake	NE 11-13-34-06	1,590									
79	SRC Whitecap	SW 15-13-34-06	1,660									
80	NRC-SRC Whitecap	SE 14-15-33-05	1,700									
81	SRC Camp Dundrun	NE 11-24-33-05	1,720									
82	Tidewater Dundrun	01-07-33-04	1,705									
83	SRC Brightwater Marsh	NW 15-18-32-04	1,705	180		Flowing	2.4	20	3	Empress		SRC
84	SRC Dundrun	SE 09-17-32-04	1,775	280	5.3	26 PSI	2.3	20	3	Empress		SRC
85	FFIB Wilson, R.F.	SE 08-16-32-04	1,780	365	10	Flowing	2.2	25	3	Empress		SRC
86	Deleted											
87	Albercan Slim hole 44	SW 04-06-38-14	2,233									
88	SRC Oban	NW 13-32-37-14	2,250									
89	FFIB March, E.	13-24-37-14	2,300	140	10	41				Floral		
90	SWC Yoroshko, J.	SE 04-18-37-13	2,300	190	10	70				Floral		
91	FFIB Zidkovich, A.M.	NE 12-31-36-13	2,280	110	10	21				Floral		
92	SRC Neola	SW 01-33-36-13	2,200									
93	FFIB Sagan, B.	SE 13-25-36-13	1,990	230	10	25				Floral	Tessier	
94	FFIB R.M. of Perdue	NE 12-05-36-11	1,790	58	15	35				Floral	Judith	
95	SRC Eaton, N.	NE 16-35-35-11	1,775	402	27					Bedrock	River	
96	FFIB Montgomery, J.	NE 16-12-35-11	1,800									
97		SE 01-04-35-10	1,780	30		23	1.1	18	1	Floral	Tessier	SRC
98	SRC Cundy, H.P.	SE 04-28-34-10	1,800	136		38	0.7	4	3	Floral	Tessier	
99	FFIB Winder, E.	NW 15-11-34-10	1,810	120	15	40				Floral	Tessier	
100	Karr, J.	NW 16-35-33-10	1,810	54		50	1.1	4	1	Surficial		SRC
101	FFIB Brownell, K.	NE 01-35-33-10	1,810	160	10	52				Floral	Tessier	
102	SRC Laura Plots No. 1	NW 13-25-33-10	1,825	65	3	56	1.0	11	0	Surficial		SRC

INDEX OF LOSS, WEST SIDE IRRIGATION PROJECT

NO.	NAME	LOCATION (W3)	SURFACE ELEV. (ft.)	DEPTH WELL (ft.)	SCREEN LENGTH (ft.)	STATIC LEVEL (ft.)	EC MS/CM	CI PPM	SAR	GEOLOGY	AQUIFER	LAB
103	Carr, J.	SW 04-25-33-10	1,780	45	4	5	2.1	15	1	Surficial		SRC
104	Com. Laura	NW 10-19-33-09	1,740	225		20	3.0	48	7	Sutherland		SRC
105	Wilkie	NE 09-16-33-09	1,750	308		37	2.7	99	18	Empress	Tyner Valley	SRC
106	Thomson, H.A.	NW 12-15-33-09	1,750			10	1.0	7	1	Floral		SRC
107	Wilkie, O.	SE 01-15-33-09	1,750	50								
108	FFIB Uhruh, L.	NE 16-36-32-09	1,755			42				Empress	Tyner Valley	SRC
109	Com. Donovan	NW 04-24-32-09	1,760	340	10				10	Empress	Tyner Valley	SRC
110	FFIB Regehr, A.	SE 08-13-32-09	1,760			80				Surficial		SRC
111	Jenson, M.	SW 02-06-32-08	1,750	246						Surficial		SRC
112	Rogers Service	NE 01-36-31-09	1,760	23					1	Surficial		SRC
113	Fina Conquest	16-19-31-08	1,750			20			5	0		SRC
114	SSRIP Swanson	SW 04-15-31-08	1,750	30	5							
115	FFIB McNichol, M.	SW 16-34-30-07	1,760			85				Bedrock	Judith River	
116	SRC Broderick	NE 16-35-30-07	1,740	300	25					Bedrock	Judith River	
117	SWC Koster, W.	NE 15-36-30-07	1,740			79				Bedrock	Judith River	
118	FFIB Hemingway, P.	NW 04-30-30-06	1,740	330	10							
119	FFIB Lea, K.	NW 14-10-30-06	1,780									
120	SWC Broderick	NW 13-07-30-05	1,809									
121	Johnson, L.D.	SE 16-02-30-05	1,840	360	10					Bedrock	Judith River	
122	FFIB Pedersen, N.	SE 08-24-29-05	1,920	100	10	17				Flotal		SRC
123	FFIB Breitkreitz, B.	NW 14-07-34-14	2,325									
124	TW Biggar Cr. 2	09-20-34-14	2,145									
125	SRC Feudal	NW 04-10-34-13	2,080									
126	FFIB Trask, D.	NW 02-34-33-12	1,850	338	5.4	46	1.6		7	Bedrock	Judith River	SRC
127	FFIB Clayton, T.R.	SE 01-13-33-12	1,840	105	8.6	57	1.5		1	Flotal	Tessier	SRC
128	FFIB Leonard, N.	NE 11-05-33-11	1,875	142	8.6	85	1.2		1	Flotal	Tessier	SRC
129	FFIB Husband, D.	NE 01-32-32-11	1,850									
130	FFIB Clarkson, B.	SE 03-14-32-11	1,790	304	10.6	25	2.5		12	Bedrock	Judith River	SRC

INDEX OF LOGS, WEST SIDE IRRIGATION PROJECT

NO.	NAME	LOCATION (W3)	SURFACE ELEV. (ft)	DEPTH WELL (ft)	SCREEN LENGTH (ft)	STATIC LEVEL (ft)	EC mS/CM	CI PPM	SAR	GEOLOGY	AQUIFER	LAB
131	SWC Stevens, R.	SE 10-02-32-11	1,810	139	10.6	46				Surficial		SRC
132	FFIB Clarkson, O.	NW 13-36-31-11	1,830	128	8.6	68	1.4	14	2	Surficial		SRC
133	SSRIP Ardath 4A	NE 10-01-31-10	1,795									
134	SSRIP Conquest 51	NE 16-25-30-10	1,810	40		25	2.7	59	1	Floral		SRC
135	Ogilvie, E.	NE 16-19-30-09	1,860							Empress	Tyner Valley	SRC
136	SSRIP Conquest 10	NE 08-19-30-09	1,860	315	15	155						
137	SWC Tyler, L.	NE 08-17-30-09	1,850							Floral		SRC
138	Sibbald, H.	NW 05-16-30-09	1,860	38		18	2.5	164	0	Floral		SRC
139	SSRIP Conquest 48	SE 03-16-30-09	1,847							Bedrock	Judith River Tyner Valley	
140	Golder Associates	NW 13-28-29-08	1,726	330	3					Empress		
141	Golder Associates	NE 16-28-29-08	1,739	160	3							
142	Rankin Broderick	SW 04-19-29-07	1,770									
143	SWC Outlook 01	SE 04-16-29-07	1,826									
144	SWC Outlook 06	NW 13-26-28-07	1,873							Bedrock		
145	FFIB Nixon, C.	SW 04-27-28-06	1,940	280	10	180				Bedrock	Judith River	SRC
146	FFIB Kallio, M.	NE 16-20-28-05	2,010	550	15							
147	FFIB Taylor, C.F.	SE 02-04-28-05	2,020	640	20	150	3.6	592	60	Bedrock	Judith River	SRC
148	FFIB McLean, R.	SE 10-26-27-05	2,020	400	20	150				Bedrock	Ardkenneth	
149	FFIB Lorgager, H.	NE 15-12-27-05	2,010	570	15	165				Bedrock	Judith River	
150	FFIB Fallick, G.	NW 05-07-27-04	2,005	660	20	160	4.1	502	72	Bedrock	Judith River	SRC
151	IMP. TW. Strongfield	12-16-26-04	1,988									
152	SRC Anglia	SW 12-19-31-15	2,090									
153	IMP. TW. Rosetown	12-19-31-15	2,088									
154	FFIB Rosetown	NW 09-03-31-15	2,010									
155	Hutterian Colony			399	20	138				Bedrock	Rosetown Low	
156	SRC Rosetown	NW 13-24-30-15	1,930									
157	IMP. Fortune	13-20-30-14	1,933									
158	SRC Pym	SW 05-23-30-14	1,940									

INDEX OF LOSS, WEST SIDE IRRIGATION PROJECT

NO.	NAME	LOCATION (W3)	SURFACE ELEV. (ft)	DEPTH WELL (ft)	SCREEN LENGTH (ft)	STATIC LEVEL (ft)	EC μ S/CM	Cl PPM	SAR	GEOLOGY	AQUIFER	LAB
158	FFIB Lefeure, M.	NE 16-05-30-13	1,920	500	15	160				Bedrock	Judith River	
159	Deleted	15-36-29-13	1,939									
160	ZO HB Rosetown	SE 03-30-29-12	1,920	480	15	86	2.2	199	40	Bedrock	Judith River	SRC
161	FFIB Heeg, A.											
162	FFIB Milden	SW 14-17-29-11	1,890	455	15	78	3.2	13	16	Empress	Tyner Valley	SIL
163	Dasiuk, S.J.	SW 15-17-29-11	1,875	500			3.2	235	17	Bedrock	Judith River	SRC
164	FFIB Gates, L.	NW 15-09-29-11	1,860	442	15	70				Empress	Tyner Valley	
165	V of D Dinsmore 10	NE 12-31-27-10	2,028	130	3	114				Floral		
166	V of D Dinsmore 01	SW 10-31-27-10	1,962	102	10	74		21	21	Floral		SRC
167	V of D Dinsmore 08	SW 05-32-27-10	2,028	121	3	100	2.3			Floral		SRC
168	SRC Dinsmore	NW 13-21-27-10	2,110									
169	IMP. TW Anerley	13-21-27-10	2,100									
170	FFIB Nienan, H.	SE 08-22-27-10	2,130									
171	FFIB Blackwell, J.	NW 12-18-27-09	2,150	126	10	78				Floral		
172	FFIB Gullet, R.	SE 09-34-26-09	2,350	445	20	280		9	10	Bedrock	Ardkenneth	
173	FFIB Karpenin, R.	NE 15-28-26-09	2,370	420	10	265				Sutherland		
174	FFIB Pulkinen, R.	SW 10-32-25-09	2,490	279	8.6	251				Floral		
175	FFIB Boon, H.	SW 16-28-25-09	2,430	117	13	70				Floral		
176	TW SFH 1 Birsay	NW 07-09-25-08										
177	TW Birsay Cr. 1	13-04-25-08	2,165									
178	RD Birsay	07-34-24-08	1,950	480	10					Bedrock	Ardkenneth	
179	SRC Luck Lake	SW 03-27-24-08	1,920									
180	FFIB Ward, G.	15-07-24-07	1,930	416	10	210				Bedrock	Ardkenneth	
181	RD Jones, J. E.	NW 05-30-23-07	1,960	411	10	220		710	68	Bedrock	Ardkenneth	
182	WRB Greenbrier	SW 04-13-23-08	1,954	EL. Top Screen 1,546	3	EL. WL 1,720	3.4			Bedrock	Ardkenneth	
183	RMH 1 Lucky Lake	SW 04-05-23-07	1,930	EL. Top Screen 1,585	3	EL. WL 1,719				Bedrock	Ardkenneth	

INDEX OF LOGS, WEST SIDE IRRIGATION PROJECT

NO.	NAME	LOCATION (W3)	SURFACE ELEV. (ft)	DEPTH WELL (ft)	SCREEN LENGTH (ft)	STATIC LEVEL (ft)	BC MS/CM	CL PPM	SAR	GEOLOGY	AQUIFER	LAB
184	RDH 7C Lucky Lake	SW 04-33-22-07	1,704	El. Top Screen 1,529	3	Flowing				Bedrock	Ardkenneth	
185	RDH 5C Lucky Lake	NW 05-27-22-07	1,952	El. Top Screen 1,577	3	El WL 1,925				Bedrock	Ardkenneth	
186	SRC Biggar	NE 16-36-35-15	2,150	149	8	90				Floral		
187	Lloyd Eagle Hills 2	03-06-36-14	2,175									
188	EPD Biggar	SW 03-08-36-14	2,200									
189	SRC Biggar	SW 05-17-36-14	2,220									
190	FFIB Noxwell, N.	NE 15-14-36-14	2,300	375	15	65				Sutherland		
191	SOHLO Red Cr. Arelee 3	14-11-37-12	1,865									
192	SRC Arelee	SW 02-14-37-12	1,870									
193	CONT. POT. Arelee	07-04-38-11	1,799									
194	EPD Arelee	NE 08-15-38-11	1,790	266	8.6	48	2.2	11	31	Bedrock	Judith River	SRC
195	U of S Eagle 27	SW 02-06-39-10	1,730									
196	U of S Eagle 21	NW 02-05-39-10	1,605									
197	U of S Eagle 20	SW 10-05-39-10	1,495									
198	U of S Eagle 19	SE 16-05-39-10	1,680									
199	PW Eagle Creek	NE 03-03-39-10	1,730									
200	U of S Eagle 18	SE 03-05-39-09	1,620									
201	U of S Eagle 12	NW 13-09-39-09	1,480									
202	EPD Borden	NW 02-33-39-09	1,640	90	18	16	0.8	5	0	Surficial		SRC
203	SIP Radisson 85-304	NW 05-29-40-08	1,840									
204	SIP Radisson 85-302	SW 04-11-41-08	1,745									
205	FFIB Epp, W.	SE 01-33-29-16	2,050	210	10	120				Sutherland Bedrock	Judith River	
206	FFIB Janke, B & R	NE 14-31-29-15	1,980	728	15	100						
207	SWC Ernst, A.	NE 14-34-29-15	1,920	321	15'	8						
208	Meritt, H.O.	SW 07-12-30-15	1,925						33	Bedrock	Rosetown Low	SRC
209	FFIB Cargill	NW 06-16-30-14	1,930	250	4.3	70	2.6	56	6	Bedrock	Rosetown Low	SRC
210	FFIB Dowie, D.	SW 13-30-30-13	1,960	660	15	110				Bedrock	Judith River	

INDEX OF LOGS, WEST SIDE IRRIGATION PROJECT

NO.	NAME	LOCATION (WB)	SURFACE ELEV. (ft.)	DEPTH WELL (ft.)	SCREEN LENGTH (ft.)	STATIC LEVEL (ft.)	EC mS/C4	Cl PPM	SAR	GEOLOGY	AQUIFER	LAB
211	FFIB Fraser, W.	SW 02-05-31-13	1,960	408	10	75				Bedrock	Judith River	
212	FFIB Murphy, V.	SW 03-16-31-13	1,950	460	10	90				Bedrock	Judith River	
213	SWC Clark, D.	SE 16-22-31-13	1,875	380	10	15				Bedrock	Judith River	
214	FFIB Jadway, Farms	SE 01-05-32-13	1,960	110	20	40				Floral	Tessier	
215	SRC Valley Centre	NE 09-23-32-13	1,920	95	15	60				Floral	Judith River	
216	FFIB Tyson, D.	SW 02-05-33-12	1,880	360	10.6	8				Bedrock	Judith River	
217	FFIB McFarlane, R.	SW 01-04-33-12	1,880									
218	FFIB Stevens, W.R.	SE 03-02-33-12	1,880	125	4.3	86				Floral	Tessier	
219	SRC Tessier	SE 01-29-33-11	1,830									
220	SRC Tessier	NW 13-33-33-11	1,820	85.5	4	32	1.4	12	1	Floral	Tessier	SRC
221	SWC Coben, D.	SE 01-04-34-11	1,810	120	10.5	31				Floral	Tessier	
222	SRC Tessier	SE 01-02-34-11	1,790	70		36	1.2		1	Floral	Tessier	SRC
223	Com. Laura	SW 12-03-34-10	1,800									
224	Com. Laura	SW 05-18-34-09	1,800									
225	Chizek, G	NE 01-24-34-10	1,800	24		22	0.8	4	0	Surficial		SRC
226	Com. Delisle	SW 04-30-34-09	1,790									
227	Com. Delisle (Weber)	SE 01-06-35-09	1,790	25		18	0.6	4	0	Surficial		SRC
228	Com. Delisle	NE 16-07-35-09	1,790									
229	Com. Asquith	SW 13-20-35-09	1,790									
230	Com. Asquith	NW 15-32-35-09	1,770									
231	Com. Urban	SW 13-18-36-09	1,780									
232	FFIB Lake, R.J.	SE 02-31-36-09	1,720	342	20	30				Bedrock	Judith River	
233	Woodside	SE 09-32-36-09	1,700	54		22						
234	SWC Willings, R.	SE 08-09-37-09	1,670	212	20	10	1.2	8	2	Surficial Bedrock	Judith River	SRC
235	FFIB Allan, G.	NE 09-10-37-09	1,640	215	15	16				Empress		
236	National Potash	13-14-37-09	1,648									
237	FFIB Dyck, J.	SW 02-27-37-09	1,680	58	8.5	27	1.2	20	2	Surficial		SRC
238	FFIB Hamm, G.	NW 13-27-37-09	1,650	110	10	37	2.1	63	5	Surficial		SRC
239	Olson, H.	SW 05-34-37-09	1,650	35			1.4	167	2	Surficial		SRC
				152			1.6	70	2	Floral		SRC

720-13 ✓

220-14 ✓

738-3 ✓

INDEX OF LOGS, WEST SIDE IRRIGATION PROJECT

NO.	NAME	LOCATION (W3)	SURFACE ELEV. (ft.)	DEPTH WELL (ft)	SCREEN LENGTH (ft)	STATIC LEVEL (ft)	EC MS/CM	CI PPM	SAR	GEOLOGY	AQUIFER	LAB
360	Saakatoon Ex. 1	NW 15-17-36-05										
361	U of S Kilburn Park	NW 09-20-36-05	1,636									
362	U of S Saakatoon	NW 07-28-36-05	1,645									
363	SRC Saakatoon	NW 04-34-36-05	1,620									
364	SRC Saakatoon	NE 05-34-36-05	1,620									
365	SRC Saakatoon	SW 11-34-36-05	1,618									
366	SRC Sutherland	SW 12-01-37-05	1,650									
367	SRC Forestry Farm	SW 07-12-37-05	1,655									
368	SRC Sutherland	SW 05-13-37-05	1,630									
369	EPD Sutherland	SE 01-24-37-04	1,650									
370	CAL Forestry Farm	SE 09-19-37-04	1,650									
371	SRC Sutherland	NE 08-25-37-05	1,610									
372	UMA Saakatoon 05	SE 03-01-38-05	1,630									
373	UMA Saakatoon 01	NW 12-05-38-04	1,630									
374	PDL Clarkboro	NW 15-09-38-04	1,620	282	10	90	3.9	116	11	Empress	Tyner Valley	SRC
375	U of S Eagle 61	NE 09-16-38-04	1,634									
376	ENL Warman 2	SW 03-28-38-04	1,640									
377	ENL Warman 4	NE 15-28-38-04	1,635									
378	Noxvanian Kam Dinsmore	05-24-24-12	2,419									
379	SRC Walsh Bros.	SE 02-17-24-11	2,400	170	10	80	1.8	1	3	Floral		STL
380	Inverarity, F.	NE 02-22-24-11	2,260				3.9	3	5			STL
381	Kallio, W.	NW 16-26-24-11	2,250				1.7	1	3			STL
382	SRC Luck Lake	SW 04-01-25-11	2,250									
383	FFIB Kamppainen, W.	NE 15-30-25-09	2,430	146	8.6	30				Floral		
384	MVC 3	NE 08-24-26-08	2,040									
385	FFIB Forsberg, J.D.	NE 16-32-26-07	1,910									
386	SWC Forsberg, A.A.	NE 04-10-27-07	1,800	162	10	110				Bedrock	Ardkenneth	
387	Pollock, D.H. 1962	NE 03-01-27-07	1,845									
388	SRC Outbank	SE 01-06-27-06	1,890	468	20	208				Bedrock	Ardkenneth	
389	PW Strongfield	SW 03-25-27-06	2,025									
390	SRC Strongfield	SW 04-29-27-05	2,020	640	15	210				Bedrock	Judith River	
391	FFIB Tastad, R.G.	SW 02-29-27-05	2,020									
392	FFIB Birch, J.	NE 16-21-27-05	2,020	610	15	187				Bedrock	Judith River	

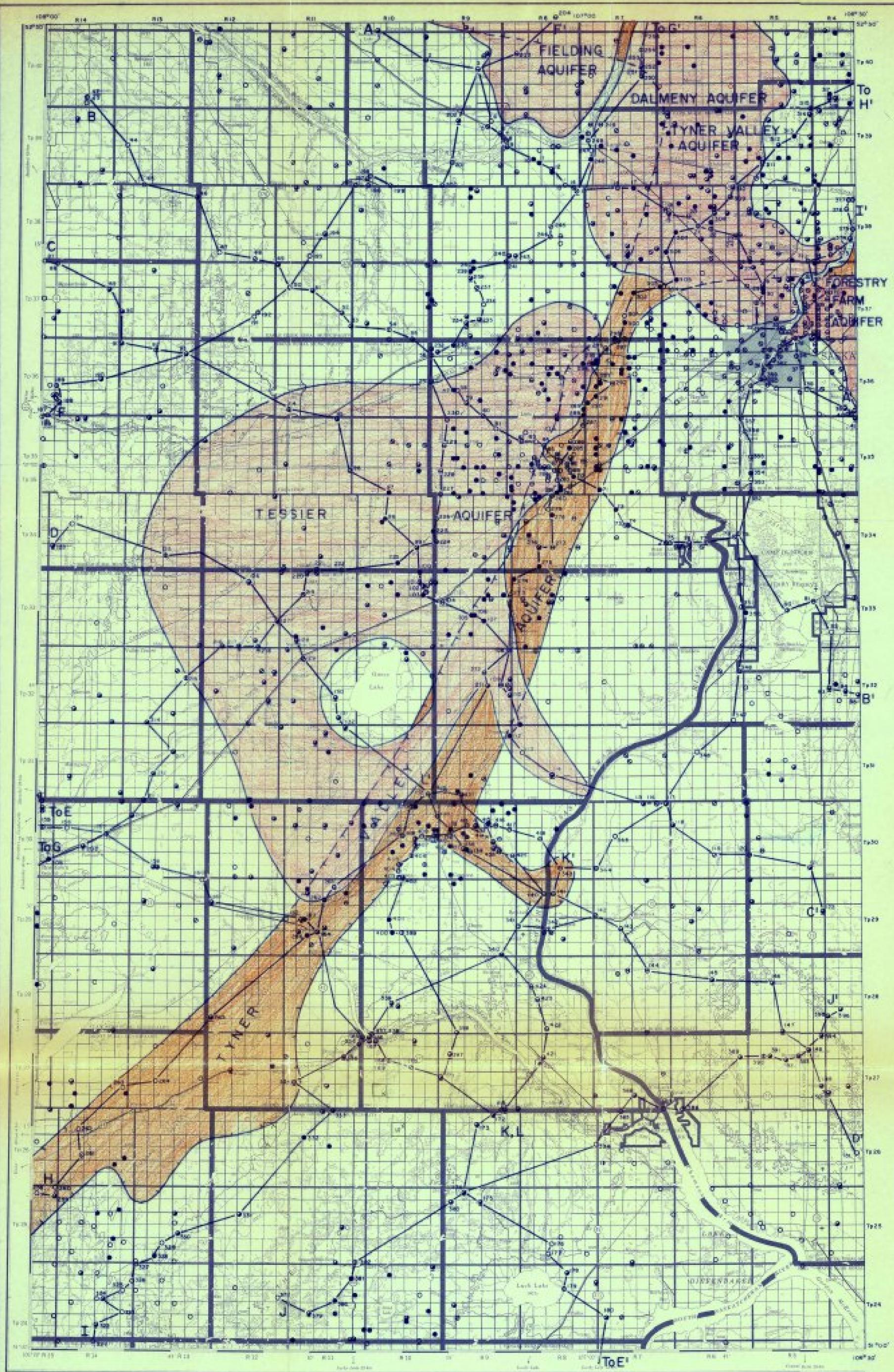
INDEX OF LOSS, WEST SIDE IRRIGATION PROJECT

NO.	NAME	LOCATION (W3)	SURFACE ELEV. (ft)	DEPTH WELL (ft)	SCREEN LENGTH (ft)	STATIC LEVEL (ft)	DC MS/CM	CL PPM	SAR	GEOLOGY	AQUIFER	LAB
393	FFIB Norrish, D.	SE 01-27-27-05	2,020	560	15	205				Bedrock	Judith River	Rutherford
394	FFIB Falllick, G.	NE 15-36-27-05	2,020	620			TDS 2.4	10	49	Bedrock	Judith River	
395	FFIB Christiansen, R.	NW 05-07-38-04	2,000	600	20	20				Bedrock	Judith River	
396	FFIB Luckl, D.	NE 13-08-28-04	1,980	580	20	120				Bedrock	Judith River	
397	EPD Sarbiton	SE 08-30-27-09	2,150	128	4	103				Floral		
398	SWC Mann, S.	NE 03-05-28-09	2,080	143	11	120				Floral		
399	SSRIP Bounty	NE 13-10-29-10	1,920									
400	Barton, P.H.	NE 14-09-29-10	1,925	39	3	18	3.6	160	15	Floral		
401	Weldon, S.	NW 13-16-29-10	1,920	540		120	4.6	839	278	Bedrock	Judith River	
402	EPD Bounty	SW 04-03-30-10	1,870									
403	SSRIP Conquest 8	NE 01-04-30-10	1,865									
404	SSRIP Conquest 34	NE 09-04-30-10	1,885									
405	SSRIP Conquest 17	NE 01-09-30-10	1,874									
406	SSRIP Conquest 6	NE 16-10-30-10	1,860									
407	SSRIP Conquest 53	SW 12-14-30-10	1,874	63	4	31	1.8	27	6	Floral		SSRIP Conquest Obs. Well 502
407	SSRIP Conquest 53			26	4	17	1.9	23	6	Floral		SSRIP Conquest Obs. Well 503
407	SSRIP Conquest 53			272	9	156	4.2	154	32	Sutherland		SSRIP Conquest Obs. Well 504
408	SSRIP Conquest 52	NW 04-23-30-10	1,874	27	4	18	0.9	7	4	Floral		SSRIP Conquest Obs. Well 501
409	SSRIP Conquest 42	NE 07-23-30-10	1,860									
410	SSRIP Conquest 5	NE 07-24-30-10	1,855									
411	SSRIP Conquest 4	NW 08-24-30-10	1,820									
412	SSRIP Conquest 3	NE 08-24-30-10	1,855									
413	SSRIP Conquest 22	SE 04-28-30-09	1,845									
414	SSRIP Conquest 47	NW 14-22-30-09	1,810									
415	SSRIP Conquest 9	SE 02-27-30-09	1,825									
416	SSRIP Conquest 24	SE 03-26-30-09	1,800									
417	SSRIP Conquest 23	NW 14-24-30-09	1,752	65			1.5	14	7	Surficial		SSRIP Relief Well 001

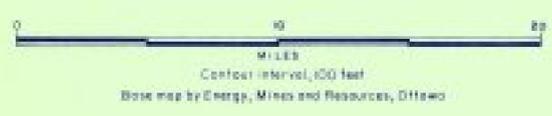
INDEX OF LOGS, WEST SIDE IRRIGATION PROJECT

NO.	NAME	LOCATION (W3)	SURFACE ELEV. (ft)	DEPTH WELL (ft)	SCREEN LENGTH (ft)	STATIC LEVEL (ft)	EC μ S/CM	Cl PPM	SAR	GEOLOGY	AQUIFER	LAB
418	SSRIP Conquest 27	SE 01-20-30-08	1,740	158	10.6	99						
419	FFIB R# Fertile Valley	SE 04-01-27-09	2,140									
420	Macrorie	NE 09-20-27-08	1,940	167	10	80						
421	FFIB Yahn, Sadle	SW 04-28-27-08	1,950	108	5	61	2.0	7	29	Floral	Ardkenneth	
422	SVC Conquest	NW 06-04-28-08	1,894							Bedrock	Ardkenneth	
423	W#1-84-RH-02	SW 10-17-28-08	1,892									
424	SVC Conquest	SE 12-20-28-08	1,897									
425	W#1-84-RH-03	NW 15-12-30-09	1,747									
426	SSRIP Conquest 49	SW 02-14-30-09	1,815									
427	FFIB Ogilvie, D.	NE 12-04-31-09	1,840	342	15	110	3.3	276	37	Empress	Tyner Valley	SRC
428	SSRIP Ardath 1	NE 16-06-31-09	1,817									

STL Soil Testing Laboratory
 SRC Saskatchewan Research Council



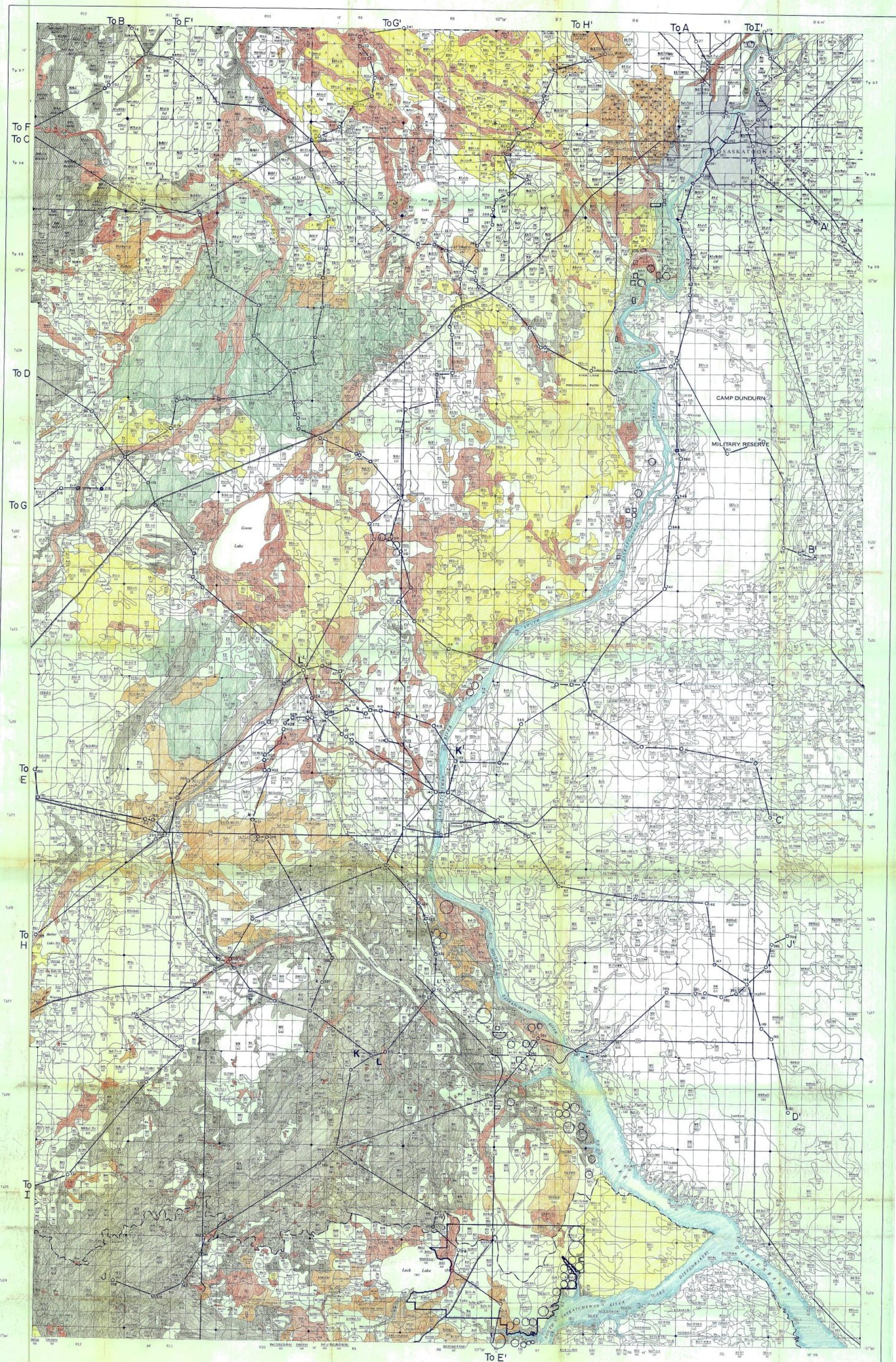
INFORMATION SHEET ON THE WEST SIDE IRRIGATION PROJECT SASKATCHEWAN



- TESTHOLES**
- Electric logs, cutting samples, and cones
 - ⊙ Electric logs and cutting samples
 - ⊙ Electric and driller's logs
 - Electric and/or gamma-ray logs
 - ⊙ Augerhole logs
- WELLS AND PIEZOMETERS**
- Electric logs, cutting samples, and cones
 - ⊙ Electric logs and cutting samples
 - ⊙ Electric and driller's logs
 - Electric and/or gamma-ray logs
 - ⊙ Augerhole logs
 - Cutting samples
 - Well inventories with chemical analyses

- TYNER VALLEY AQUIFER
- DALMENY, FIELDING, FORESTRY FARM, AND TESSIER AQUIFERS
- A-A' Cross section
- ⊙⁶⁶ Log number
- ⊙ Bar denotes chemical analysis

E. A. CHRISTIANSEN CONSULTING LTD.
 Created by 0114-001-01
 Drawn by E. A. Christiansen
 Date 27 November 1986



Scale 1 inch to 2 miles or 1:126,720

[] Could be irrigated but not recommended as existing
 [] Existing irrigation
 - - - West Main Canal
 A-A' Cross Section
 O 101 Log Number

WEST SIDE IRRIGATION STUDY

SOIL INTERPRETATION MAP

soil information from soils of Rosetown (720) and Saskatoon (73B) map areas by Saskatchewan Institute of Pedology

INTERPRETIVE LEGEND
by J.L. Henry

- [] Saline inclusions - not recommended for irrigation
- [] Solonch inclusions - not recommended for irrigation
- [] Sandy soils - limited nutrient supplying and moisture holding capacity
- [] Rolling land - slopes - > 5%
- [] Most suitable irrigation lands considering soils, topography and hydrogeology



DRAWING NO. 101-101-10-10 CROSS SECTION A-A WEST SIDE BRIDGE ON PROJECT
 SHEET NO. 1 OF 1
 DATE: 11/1/58
 SCALE: AS SHOWN
 PROJECT: SAGARWADI RIVER BRIDGE

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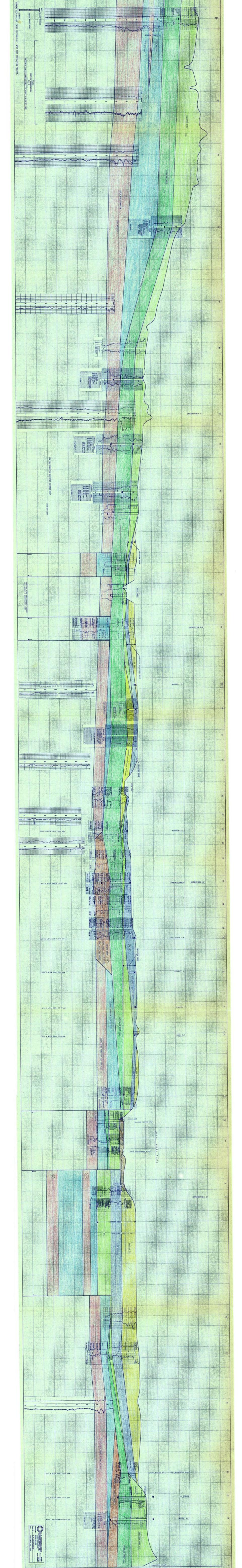
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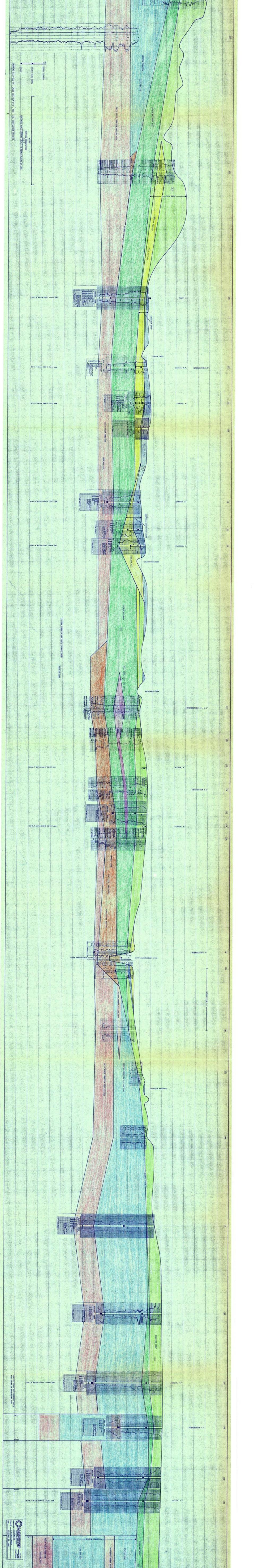
ROADWAY
 RAILROAD
 SEWER
 WATER MAIN
 GAS MAIN
 ELECTRIC CABLE
 TELEPHONE CABLE
 CABLE TELEVISION CABLE
 FIRE HYDRANT
 VALVE
 MANHOLE
 WELL
 PUMP
 TANK
 SUMP
 DRAINAGE DITCH
 DRAINAGE CANAL
 DRAINAGE TRENCH
 DRAINAGE PIPE
 DRAINAGE DUCT
 DRAINAGE CHANNEL
 DRAINAGE DRAIN
 DRAINAGE GULLY
 DRAINAGE RAVINE
 DRAINAGE CREEK
 DRAINAGE RIVER
 DRAINAGE LAKE
 DRAINAGE POND
 DRAINAGE SWAMP
 DRAINAGE MUDFLAT
 DRAINAGE BEACH
 DRAINAGE DUNE
 DRAINAGE SANDHILL
 DRAINAGE MOUND
 DRAINAGE HILL
 DRAINAGE MOUNTAIN
 DRAINAGE PLATEAU
 DRAINAGE BASIN
 DRAINAGE VALLEY
 DRAINAGE CANYON
 DRAINAGE GORGE

SOIL MECHANICS
 FOUNDATION ENGINEERING
 SLOPE STABILITY
 EARTH RETENTION
 GROUNDWATER ENGINEERING
 ENVIRONMENTAL ENGINEERING
 STRUCTURAL ENGINEERING
 MECHANICAL ENGINEERING
 ELECTRICAL ENGINEERING
 CIVIL ENGINEERING
 CHEMICAL ENGINEERING
 NUCLEAR ENGINEERING
 AEROSPACE ENGINEERING
 MARINE ENGINEERING
 AGRICULTURAL ENGINEERING
 FOOD ENGINEERING
 TEXTILE ENGINEERING
 PAPER ENGINEERING
 LEATHER ENGINEERING
 RUBBER ENGINEERING
 PLASTIC ENGINEERING
 GLASS ENGINEERING
 CERAMIC ENGINEERING
 METALS ENGINEERING
 WOOD ENGINEERING

1960

FEET ABOVE SEA LEVEL

FEET ABOVE SEA LEVEL



SECTIONAL CONSTRUCTION
 MATERIALS, SOILS, FOUNDATION, DAM, AND STRUCTURAL DETAILS, AS SHOWN
 SHOWING ELEVATIONS AND CROSS SECTION OF THE DAM AND FOUNDATION PROJECT

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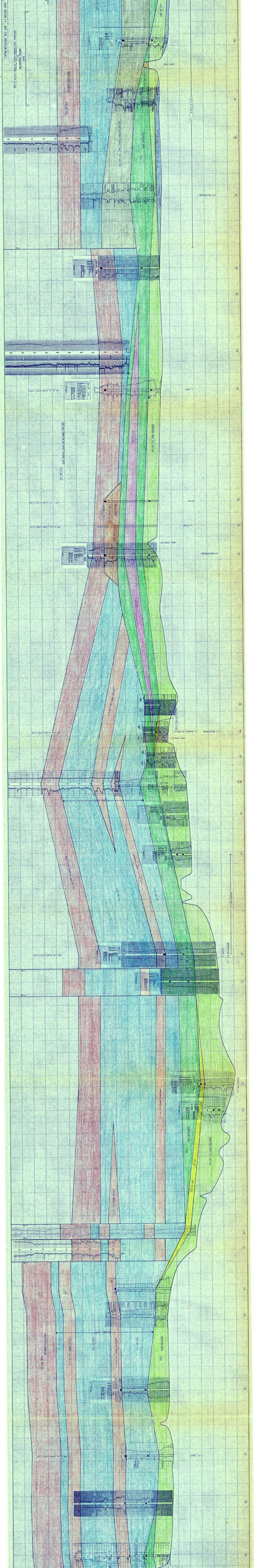
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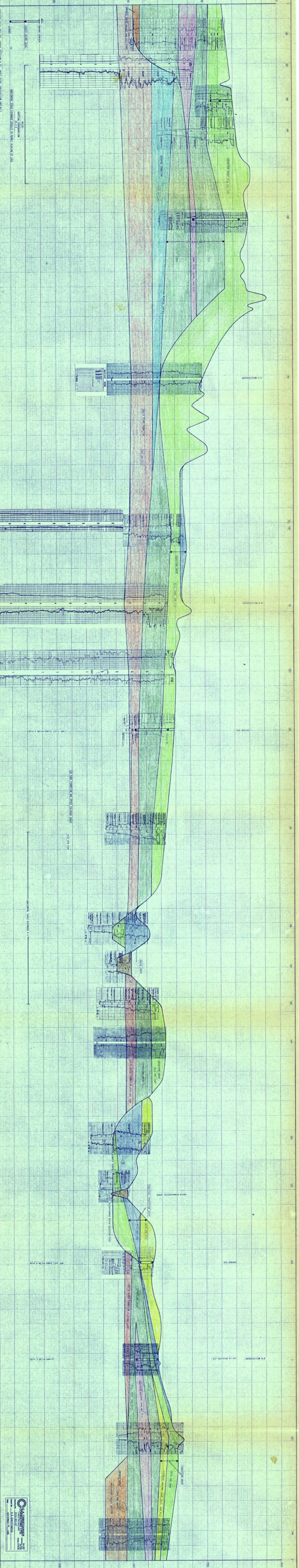
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 ENGINEERS AND ARCHITECTS
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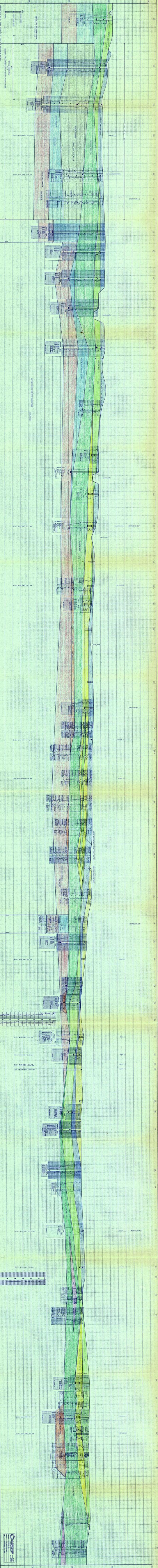


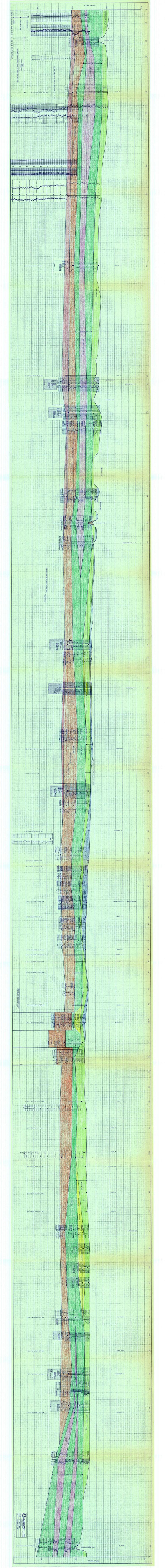
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 NEW YORK, N. Y. 10024
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 R. W. WOOD
 W. W. WOOD
 W. W. WOOD

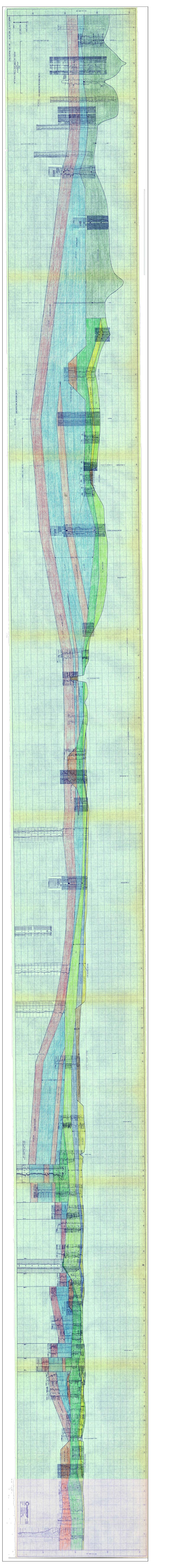




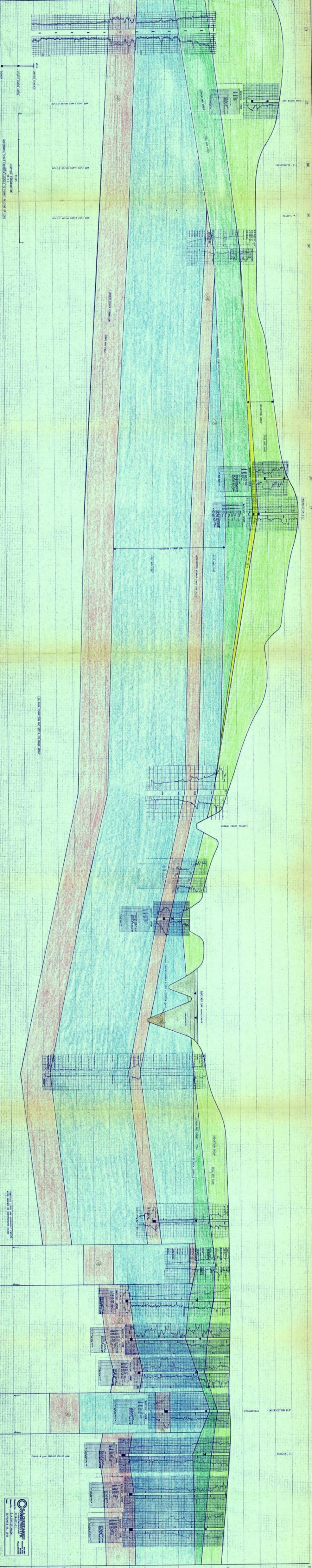
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 CONSULTING ENGINEERS
 100/100A WILSON ROAD
 WILSON PROMENADE
 WESTPORT, NEW ZEALAND
 PHONE: +64 3 308 9000
 FAX: +64 3 308 9001
 WWW: WWW.SEASWINBURNE.CO.NZ







FEET ABOVE SEA LEVEL



1000 900 800 700 600 500 400 300 200 100 0

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VERTICAL EXAGGERATION

HORIZONTAL SCALE FRACTIONAL EQUIVALENT TO HORIZONTAL SCALE OF 1:2000

CLAYSTONE BED

COURTNEY CREEK VALLEY

ROADWAY

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INTERSECTION Q-Q

INTERSECTION R-R

INTERSECTION S-S

INTERSECTION T-T

INTERSECTION U-U

INTERSECTION V-V

INTERSECTION W-W

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INTERSECTION Z-Z

INTERSECTION AA-AA

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CH2M HILL

Geotechnical Engineering

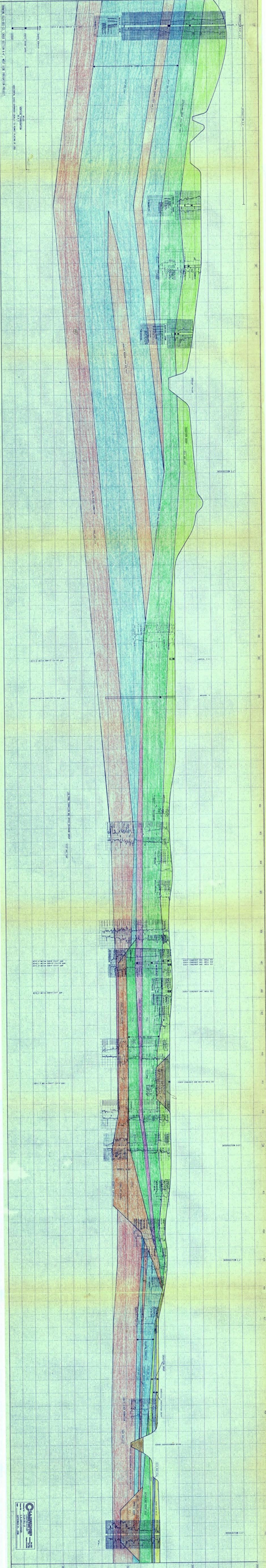
11111 11th Street, Suite 1000

Denver, CO 80202

Phone: 303.733.1111

Fax: 303.733.1111

www.ch2mhill.com



INTERSECTION L-1

INTERSECTION L-2

INTERSECTION L-3

INTERSECTION L-4

FEET ABOVE SEA LEVEL

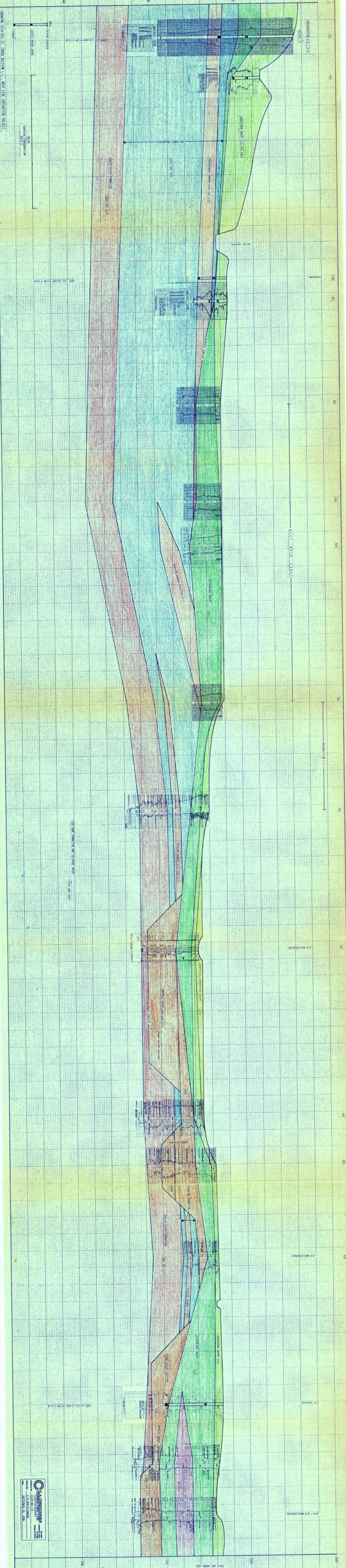
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FEET ABOVE SEA LEVEL

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 CONSULTANTS
 1000 WEST 10TH AVENUE
 DENVER, COLORADO 80202
 PHONE 733-1000
 TELETYPE 733-1000
 FOUNDED 1910



SHAWING 0114-00-13, CROSS SECTION 1-1, WEST SIDE IRRIGATION PROJECT

VERTICAL CURVATURE

VERTICAL ALIGNMENT

VERTICAL EXaggerATION 20:1

VERTICAL SCALE 1" = 2'-0"

STATION 0+00

STATION 1+00

STATION 2+00

STATION 3+00

STATION 4+00

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INTERSECTION 25+0'

INTERSECTION 26+0'

INTERSECTION 27+0'

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INTERSECTION 38+0'

INTERSECTION 39+0'

INTERSECTION 40+0'

INTERSECTION 41+0'

INTERSECTION 42+0'

INTERSECTION 43+0'

INTERSECTION 44+0'

INTERSECTION 45+0'

INTERSECTION 46+0'

INTERSECTION 47+0'

INTERSECTION 48+0'

INTERSECTION 49+0'

INTERSECTION 50+0'



STATE OF CALIFORNIA
 DEPARTMENT OF WATER RESOURCES
 DIVISION OF WATER CONSTRUCTION
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