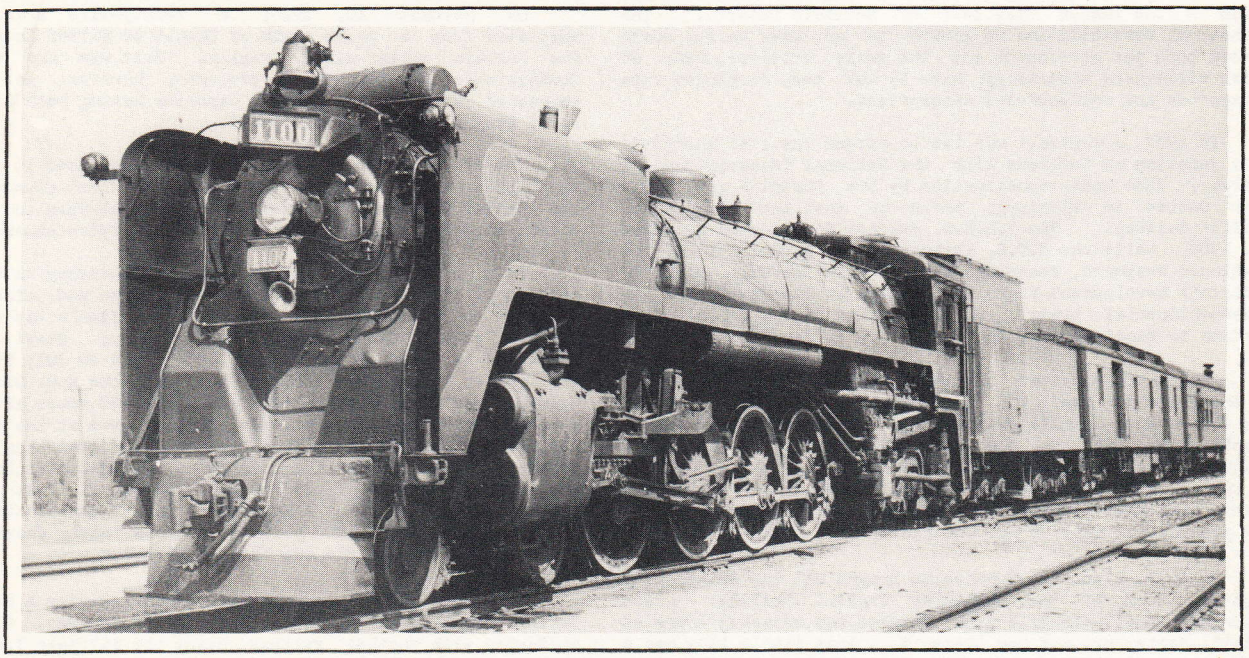
Upper Canada Railway Society

BULLETIN 29

THE ONTARIO NORTHLAND RAILWAY

By A. ANDREW MERRILEES



1100 leading "The Northland" at Porquis.
J. Norman Lowe Photo.

The discovery of natural resources in an undeveloped area has in the past been the traditional reason for the opening of the district by railway construction. Few, indeed, have been the lines successfully built on faith alone - on an assumption that by providing transportation, settlement and traffic would surely follow.

The Temiskaming & Northern Ontario, or as we now know it, the Ontario Northland, was one such line. At the time it was projected through the forests and wilderness extending from Lake Nipissing toward James Bay, it was purely and simply a development road - built by the Provincial government because the area did not show sufficiently attractive traffic possibilities to attract private railway promoters.

Today, the district it serves supports a prosperous and rapidly growing population, and whole new industries previously unknown in the Province of Ontario. The railway has repaid the vision and faith of the Province and its people a thousandfold.

At the beginning of this century, the town of North Bay was a division point on the Canadian Pacific main line from Montreal to Vancouver, while a secondary route of the Grand Trunk Railway reached up to it from Toronto far to the south. No line of railway extended northward from the C.P.R. main line within the Province of Ontario.

As many as twenty years earlier, lumbering interests had begun to penetrate this region to harvest the virgin pine and spruce. Their only highways were Lake Temiskaming and its tributary streams, but these were often unreliable in winter, as well as during the spring break-up, and the fall freeze-up. In this period, also, a few settlers had made their homesteads at the head of Lake Temiskaming, in the vicinity of the present town of New Liskeard. These hardy families were almost completely isolated from their fellow men, their markets, and their sources of supply, and had for some years been making insistent demands for rail connection with the south.

A series of surveys conducted by the Provincial government in the year 1900 showed, in addition to extensive stands of valuable timber, large areas of arable land, and hinted at the possibility of discovering important mineral deposits. In 1902 a board of commissioners, to be known as the Temiskaming & Northern Ontario Railway Commission, was appointed by the legislature, with authority to build a line of railway from North Bay to a point on Lake Temiskaming.

The first contract was let by the Commission to A.R. Macdonell on October 3, 1902, covering the complete construction of the 110 miles of railway from North Bay to New Liskeard, the first sixty miles to be completed by December 31, 1903, and the remainder by December 31, 1904.

The formality of turning the first sod having been executed with suitable ceremony by the Hon. F.R. Latchford at North Bay, May 10, 1902, construction was commenced on October 14 of the same year, and on January 16, 1905, the completed railway to New Liskeard, 114 miles in length, was turned over to the Commission for operation.

In August, 1903, even before the line was completed, a construction employee accidentally uncovered a slab of virgin silver near mile post 103. The investigation which followed disclosed the presence of rich mineral deposits spread over a large surface. The once-roaring boom town of Cobalt was thus quickly born, and prospectors and settlers flooded into the area.

On June 7, 1904, a further contract was awarded A.R. Macdonell covering the construction of a forty-mile extension northward from New Liskeard. Steel had reached Boston Creek, the terminus of the contract by December 31, 1905, and regular service as far as Englehart was established on October 1, 1906. Two short branches were also built during 1906. One extended six miles from Cobalt to the new mining centre of Elk Lake, while the other, seven and a half miles long, ran from Englehart to Charlton.

Between New Liskeard and Englehart the line emerges from the heavily forested country onto a huge fertile northern plain - the famous Clay Belt of Northern Ontario. The phenomenal possibilities of growth in an area so far north amazed both the government and the early settlers, many of whose wilderness homesteads have by now been developed into prosperous and well-ordered enterprises.

In 1907, a contract was let to extend the line northward to a junction at Cochrane with the National Transcontinental Railway, then under construction by the Dominion government from Quebec to Winnipeg, there to meet the Grand Trunk Pacific Railway. The T.& N.O. reached Cochrane on November 26, 1908, while the N.T.R. arrived on the scene in 1910, and continued westward, reaching the Prairie gateway in 1915. Ontario's development road then became an important link in transcontinental travel, through trains being routed from Toronto to Winnipeg over its line.

Gold was discovered in the Porcupine area in 1909, and in the following year the Commission started work with its own forces on a 33-mile branch from Porquis Jct. (now called simply "Porquis") to the new mining area. This branch reached South Porcupine on June 16, 1911, and Timmins on July 1, 1911. This town became a larger and much more permanent mining camp than Cobalt, and is now perhaps the most modern and progressive city in all Ontario's Northland.

In 1911, also, the Commission bought all the outstanding capital stock of the Nipissing Central Railway, which operated a small electric line between the adjacent towns of Cobalt, Haileybury and New Liskeard. This little line had a Dominion charter, which gave it the right to build into Quebec Province, a privilege which the Ontario road lacked. This was to become of value to the T.& N.O. Commissioners some time later. In this year, also, surveys were started into the country north of Cochrane, but construction of this extension was not commenced until 1921.

The year 1912 saw construction crews at work on the 28.5 mile branch from Earlton to the mining area at Elk Lake, this line being opened on February 5, 1913. Also during 1913 a branch was built from Porquis Jct. to Iroquois Falls, to serve the huge plant of the Abitibi Power & Paper Co. Ltd., then under construction. This in now one of the largest newsprint mills in the world, and a great owner of trackage and railway equipment in its own right. This branch is seven miles long, and was open for business by September 9, 1913.

While running rights over the T.& N.O. were granted in 1912 to the National Transcontinental, a part of the Canadian Government Railways, these were not exercised until 1915, when a through service between Toronto and Winnipeg was instituted, using the T.& N.O. main line as a link between the Toronto-North Bay line of the Grand Trunk Railway and the Cochrane-Winnipeg portion of the N.T.R. By 1922 this train had been discontinued as a result of the construction of the Longlac-Nakina cutoff connecting the main lines of the former Canadian Northern and National Transcontinental Railways. However, until 1930 the Canadian National's "Continental Limited" continued to use the T.& N.O. as part of its route between Montreal and Vancouver. This route consisted of the former Canadian Northern main line east of North Bay, thence the T.& N.O. to Cochrane, the former N.T.R. to Winnipeg, and a combination of the main lines of the former Canadian Northern and Grand Trunk Pacific systems to Vancouver.

The outbreak of war in 1914 put an end for several years to ambitious railway construction projects, and may be said to mark the close of the first chapter in the life of Ontario's Development Road. The second chapter opened in 1921, with the approval by the Provincial government of an extension of the line northward from Cochrane, with the object of eventually reaching James Bay, and of giving Ontario a seaport of her very own. A contract covering the construction of seventy miles of line, from Cochrane to Fraserdale, was let on January 7, 1922, and the line was open as far as Coral Rapids by November 1, 1923. The building of this branch was designed to make possible the construction of a huge hydro-electric power plant in the canyon of the Abitibi River.

Also in 1923, work was started on a branch from Swastika northeastward to the bustling new gold mining area around Kirkland Lake and Larder Lake. This was built under the Nipissing Central charter, with a view to eventually entering Quebec. This branch was completed to Larder Lake on November 10, 1924, to the Quebec border in 1925, and to Rouyn and Noranda in 1927.

On November 10, 1924, a twenty-mile branch was completed from a point south of Cobalt to Silver Centre, in the Lorrain silver mining region. This was one of the Commission's shortest-lived projects, however, as it was abandoned in 1935, the mineral deposits having been found to be of less value than anticipated.

The short branch to Kerr Lake was abandoned in September, 1927, thus becoming the T.& N.O.'s first abandonment. The general decline in activity in the once-fabulous Cobalt silver mining area was the reason for this retrenchment.

From 1928 to 1932 construction was underway on the extension of the Fraserdale line through barren and uninhabited country to Moosonee, near the ancient Hudson's Bay Company trading post of Moose Factory, on James Bay. Steel reached the final terminus in the fall of 1931, and on July 15, 1932 the golden spike was driven home by the Hon. George S. Henry, then Premier of Ontario, exactly 300 years after the English explorer, Captain James, had arrived at the spot in his sailing ship. Among those present, and assisting at the ceremony, was Mr. Justice Latchford, who had officiated at the turning of the first sod at North Bay in 1902, barely thirty years earlier. A monumental job of construction and development had been accomplished in those thirty short years by the people of Ontario and their government.

In April, 1946, the old name of Temiskaming & Northern Ontario was changed to Ontario Northland Railway, to avoid confusion with another railway using the initials T.& N.O., the Texas & New Orleans, a unit of the Southern Pacific system. The present O.N.R. includes the Swastika-Noranda line of the Nipissing Central Railway, the electric operation of this subsidiary having been abandoned years ago. The Ontario Northland Transportation Commission operates, in addition to the railway, steamboat services on Lake Nipissing and the Temagami chain, and a motor bus system paralelling the main line, and replacing passenger trains on the Elk Lake, Charlton and Iroquois Falls branches. Ontario's own system is thus leading the way in operation of co-ordinated transportation services by different types of carriers under unified management.

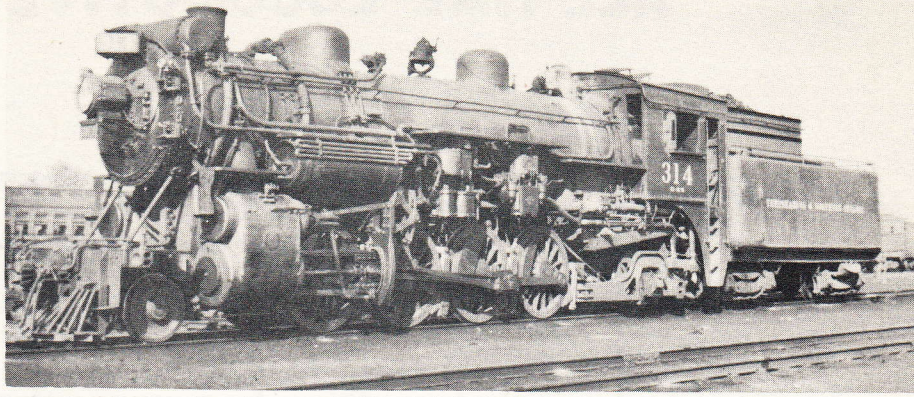
Bulletin 29 March, 1951

UPPER CANADA RAILWAY SOCIETY
Box 122, Terminal "A"
Toronto, Canada

BULLETIN #29

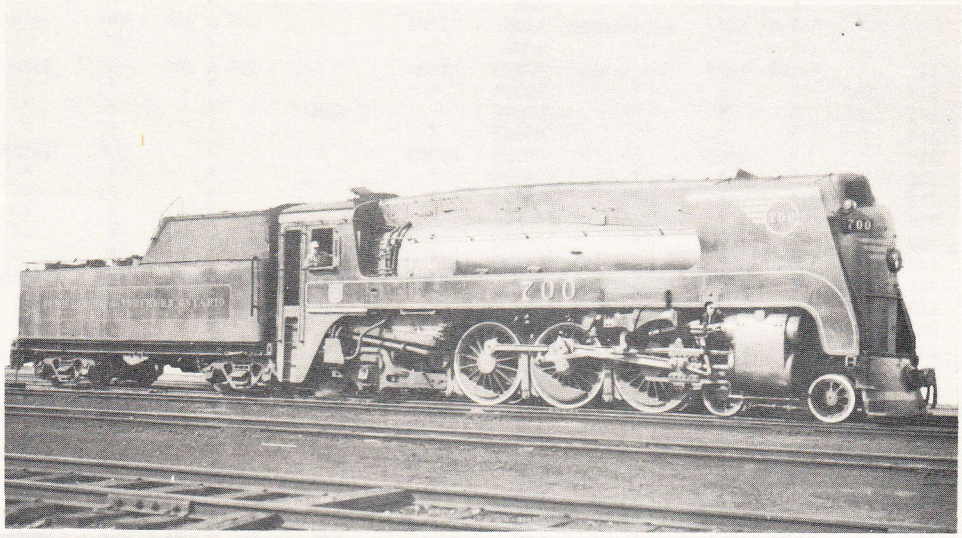
ONTARIO NORTHLAND RAILWAY

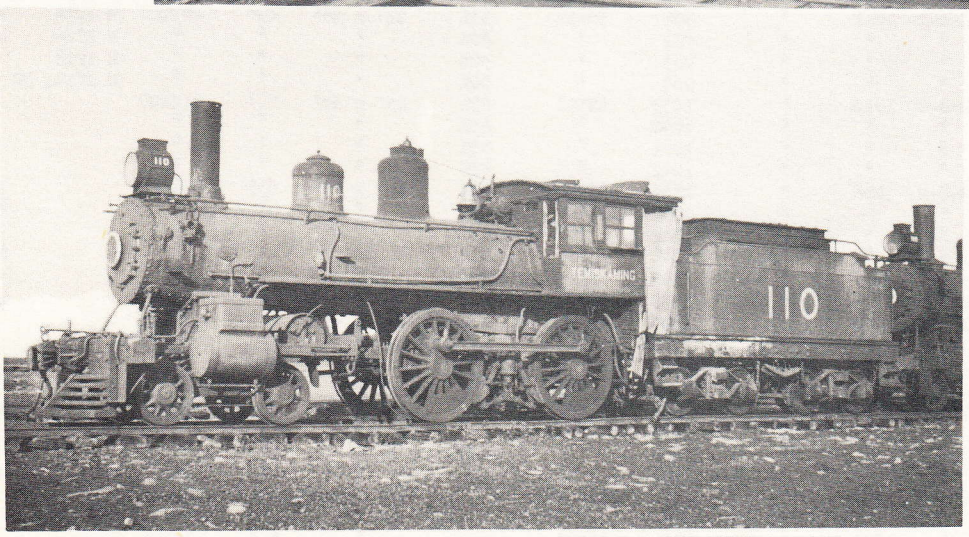
Safety - Comfort - Speed



TOP - 314 at Englehart, about to be coupled to a Timmins freight.
J. Norman Lowe photo

RIGHT - 700 before removal of streamlining.
From John R. Lee

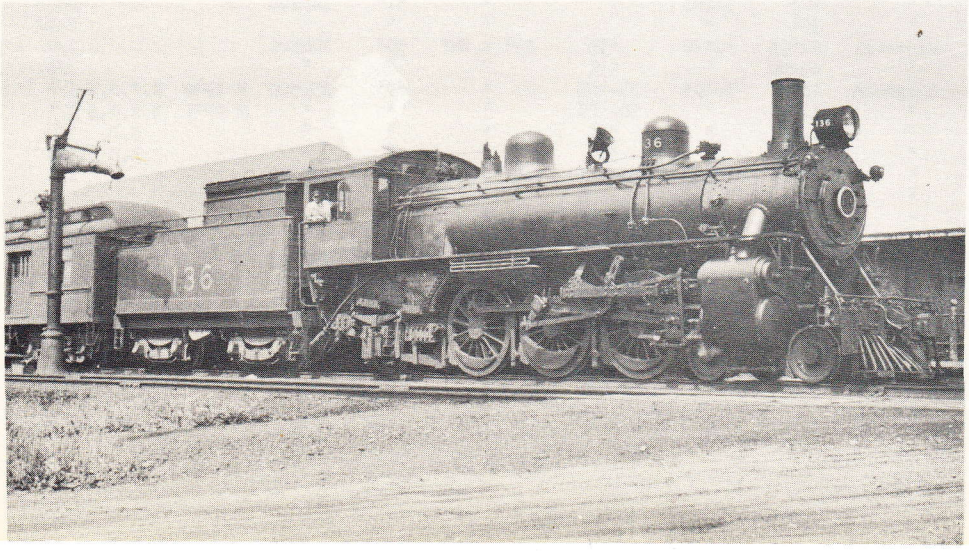




LEFT - 110 at North Bay in July, 1934.

BOTTOM - 136 on train 18 at New Liskeard, July 24, 1934.

James H. Allen photos



ONTARIO'S DEVELOPMENT ROAD

ALL-TIME LOCOMOTIVE ROSTER

STEAM LOCOMOTIVES

ROAD NUMBERS Original	1935	1940	WHEEL ARRGT	YEAR BUILT	BUILDER	SERIAL NUMBER	TRACTIVE EFFORT	HAULAGE RATING	CYLINDERS D x S	DRIVERS	ENGINE WEIGHT	REBUILT	NOTES	DISPOSITION
1 & 101			4-6-0	1903	Kingston	611	23671 lbs		19" x 24"	56"	135000			Sold
2 & 102			"	"	"	612	"		"	"	"			Sold
3 & 103			"	"	"	613	"		"	"	"			Sold
4 & 104			"	"	"	614	"		"	"	"			Sold
105			"	1906	"	689	"		"	"	138000			Sold
106			"	"	"	690	"		"	"	"			Sold
107			"	"	"	691	"		"	"	"			Sold
108			"	"	"	692	"		"	"	"			Sold
109			4-4-0	1892	Pittsburgh	1295	13240		17" x 24"	68"	88500		A	Scrap
110			"	"	"	1296	"		"	"	"		A	Scrap
111	111		4-6-0	1906	Montreal	40873	25400		19" x 24"	62"	142000		B	Scrap
112	112	100	"	"	"	40874	"		"	"	"	M 1919	B	Scrap
113	113	101	"	"	"	40876	"	23%	"	"	"	M 1919	B	I/S
114	114		"	"	"	40877	"		"	"	"		B	Scrap
115	215		"	1907	"	44165	25740		"	57"	145000		B	Sold
116	216		"	"	"	44166	"		"	"	"		B	Scrap
117	217		"	"	"	44167	"		"	"	"		B	Scrap
118	218		"	"	"	44168	"		"	"	"		B	Scrap
119	219		"	"	"	44169	"		"	"	"		B	Sold
120	220		"	"	"	44170	"		"	"	"		B	Scrap
121	221	200	"	1908	Kingston	841	26301	26%	"	56"	143800	K 1918	B	I/S
122	222	201	"	"	"	842	"	26%	"	"	"	K 1922	B	I/S
121	221	202	"	"	"	843	"		"	"	"	K 1922	B	Scrap
124	224	203	"	"	"	844	"		"	"	"	K 1922	B	Scrap
125	225	204	"	"	"	845	"	26%	"	"	"	K 1922	B	I/S
126	226	205	"	"	"	846	"		"	"	"	K 1922	B	Scrap
127	127	102	"	1909	"	905	23379		"	63"	150200	M 1919	B	Scrap
128	128	103	"	"	"	906	"		"	"	"	M 1919	B	Scrap
129	229	206	"	"	"	907	25840		"	57"	149000	M 1919	B	Scrap
130	230	207	"	"	"	908	"		"	"	"	M 1919	B	I/S
131	231	208	"	"	"	909	"		"	"	"	M 1919	B	I/S
132	232	209	"	"	"	910	"		"	"	"	M 1919	B	Stored
133	633	600	4-6-2	1911	"	961	30422	33%	21" x 28"	69"	203100	M 1914	C	I/S
134	634	601	"	"	"	962	"	30%	"	"	"	M 1914	C	I/S
135	635	602	"	"	"	963	"	30%	"	"	"	M 1914	C	I/S
136	636	603	"	"	"	964	"	30%	"	"	"	M 1914, 30	C	I/S
137	437	400	2-8-0	1912	"	1039	42598	43%	23" x 30"	57"	210600			I/S
138	438	401	"	"	"	1040	"	43%	"	"	"			I/S
139	439	402	"	"	"	1041	"	43%	"	"	"			I/S
140	440	403	"	"	"	1042	"	43%	"	"	"			I/S
141 & 300	300	300	2-8-2	1916	"	1345	45530	45%	25" x 30"	63"	258040		D	I/S
142 & 301	301	301	"	"	"	1346	"	45%	"	"	"		D	I/S
143 & 302	302	302	"	"	"	1347	"	45%	"	"	"		D	I/S
144 & 303	303	303	"	"	"	1348	"	45%	"	"	"		D	I/S
145 & 304	304	304	"	"	"	1349	"	45%	"	"	"		D	I/S
146 & 305	305	305	"	"	"	1350	"	45%	"	"	"		D	I/S
141	541	500	2-8-0	1930	"	1899	45030	48%	23" x 30"	57"	238250			I/S
142	542	501	"	"	"	1900	"	48%	"	"	"			I/S
143	543	502	"	"	"	1901	"	48%	"	"	"			I/S
144	544	503	"	"	"	1902	"	48%	"	"	"			I/S
147 & 306	306	306	2-8-2	1921	"	1688	45535	51%	25" x 30"	63"	261800	N 1923	F	I/S
148 & 307	307		"	"	"	1689	"		"	"	"			Scrap
149 & 308	308	307	"	"	"	1690	"	45%	"	"	"			I/S
150 & 309	309		"	"	"	1691	"		"	"	"		E,H	Scrap
151	851	(800)	0-6-0	1906	"	747	31913		19" x 26"	50"	121000			Scrap
152	852	(801)	"	"	"	748	"		"	"	"			Scrap
153	853	(802)	"	1909	"	903	31286		"	51"	123200			Sold
150 & 154	854	(803)	"	"	"	904	"		"	"	"			Sold
155	955	900	0-8-0	1920	Montreal	62498	42570	43%	23" x 28"	53"	208500			I/S
156	956	901	"	"	"	62499	"	43%	"	"	"			I/S
157	757	700	4-6-2	1921	Kingston	1692	36493	38-48%	"	69"	250500	N 1940	E,F,G,H	I/S
158	758	701	"	"	"	1693	"	38-48%	"	"	"	N 1941	E,F,G,H	I/S
159	759	702	"	"	"	1694	"	36%	"	"	"		E,H	I/S
160	760	703	"	"	"	1695	"	36%	"	"	"		E,H	I/S
310	310	310	2-8-2	1923	"	1740	45500	51-61%	25" x 30"	63"	278700			I/S
311	311	311	"	"	"	1741	"	51-61%	"	"	"			I/S
312	312	317	"	1924	"	1742	"	51-61%	"	"	"			I/S
313	313	313	"	"	"	1743	"	51-61%	"	"	"			I/S
314	314	314	"	1925	"	1770	"	51-61%	"	"	272700			I/S
315	315	315	"	"	"	1771	"	51-61%	"	"	"			I/S
316	316	316	"	"	"	1772	"	51-61%	"	"	"			I/S
	1100	1100	4-8-4	1936	"	1919	54500	55-65%	22½" x 30"	69"	371320		H	I/S
	1101	1101	"	"	"	1920	"		"	"	"		H	Stored
	1102	1102	"	1937	"	1921	"	55-65%	"	"	"		H	I/S
	1103	1103	"	"	"	1922	"	55-65%	"	"	"		H	I/S

BULLETIN #29

DIESEL-ELECTRIC LOCOMOTIVES

ROAD NUMBERS	TYPE	WHEEL ARRGT	YEAR BUILT	BUILDER	SERIAL NUMBER	TRACTIVE EFFORT (CONTINUOUS)	HAULAGE RATING	DRIVERS	MAX SPEED	ENGINE WEIGHT
1200 to 1202	1000 HP Switcher	B-B	1946	Alco-GE	77479-81	34000 lbs	34%	40"	60	230,000
1203	" "	"	1950	MLW-GE	77586	"	"	"	"	"
1300 to 1301	1500 HP Road Switcher	"	1949	Alco-GE	76824-25	42500	43%	"	65	245,000
1302 to 1303	" " "	"	1950	MLW-GE	76096-97	"	"	"	"	"
1304 to 1307	1600 HP Road Switcher	"	1951	"	77742-45	52500	53%	"	"	"
1500 to 1505	1500 HP Road "A" Units	"	1951	GM-Dies		40000	40%	"	"	"

All these locomotives (except 1203) are equipped with multiple-unit control. 1300 - 1307 and 1500 - 1505 have train heat boilers.

SELF-PROPELLED CARS

ROAD NUMBERS Original	1939	TYPE OF CAR	YEAR BUILT	BUILDER	CAR WEIGHT	REBUILT	DISPOSITION
1002	1000	73 ft. Gas-Electric Combination Car	1926	Brill	116400	Rebuilt to Diesel-Electric car, baggage only, with 250 HP Cummings engine, 1939.	Stored
1000	1001	Storage Battery Combination Car (DE)	1924	C C & F	55400	Rebuilt 1939 as combination trailer for 1000	I/S
1001	1002	" "	"	"	57300	Rebuilt 1939 as first-class trailer for 1000	I/S

GENERAL REMARKS

1. The all-time roster is complete to February 15, 1951.

2. Column Details

(a) Tractive effort, cylinders, drivers and engine weight details are for locomotives as originally built. Subsequent rebuildings of locomotives has changed much of this data.
(b) Tractive effort shown is without booster.
(c) Haulage rating is new haulage rating of locomotives in service as of February 15, 1951. 1% approximately equals 1000 lbs. tractive effort. Where two figures are given, second is H.R. with booster.
(d) Engine weight is weight of locomotive less tender.
(e) Locomotives were rebuilt by Kingston (K), Montreal (M), and North Bay shops (N).

3. Renumbering Details

(a) All locomotives retained road number assigned on acquisition by T.& N.O. until the general renumbering in 1935, with the exception of the following special renumberings:

- Locomotives 1 to 4 renumbered as 101 to 104 in 1905 to initiate the general numbering system with the coming of new locomotives 105 to 114.
- Locomotive 150 (0-6-0) renumbered as 154 on December 19, 1920 when locomotives 147 to 150 (2-8-2) ordered in same year.
- Locomotives 141 to 150 (2-8-2) renumbered as 300 to 309 in 1929 when locomotives 141 to 144 (2-8-0) ordered in the same year.

(b) First general renumbering took place November 1, 1935.

(c) Second general renumbering took place in December, 1940, and is still in effect. At that time locomotives 851 to 854 were assigned numbers 800 to 803, but the locomotives were disposed of without having their numbers changed.

(d) Locomotive 312 had number changed to 317 about 1943, following collision with 311 about 1938.

NOTES ON STEAM LOCOMOTIVES

A. Locomotives 109 and 110 were purchased in October, 1905 from Pittsburgh & Lake Erie R.R. 48 and 49, and were the only second-hand locomotives purchased by the T.& N.O. or O.N.R.

B. Valve gears on Locomotives 111 to 132 were changed from Stephenson to Walchaert during 1918 to 1922. These locomotives were equipped with superheaters during 1918 to 1923.

C. Locomotives 133 to 136 were superheated when rebuilt by Montreal Locomotive Works in June, 1914.

D. Locomotives 141 to 146 originally had Russian style cabs.

E. Locomotives 150 and 157 to 160 (later 309 and 700 to 703) were first locomotives in Canada to be equipped with boosters; these were applied when the locomotives were built. Boosters have since been removed from 159, 160 (702, 703).

F. Valve gears on 306, 307, 700, 701 (formerly 306, 308, 157, 158) were changed from Young to Baker in 1941 and 1942.

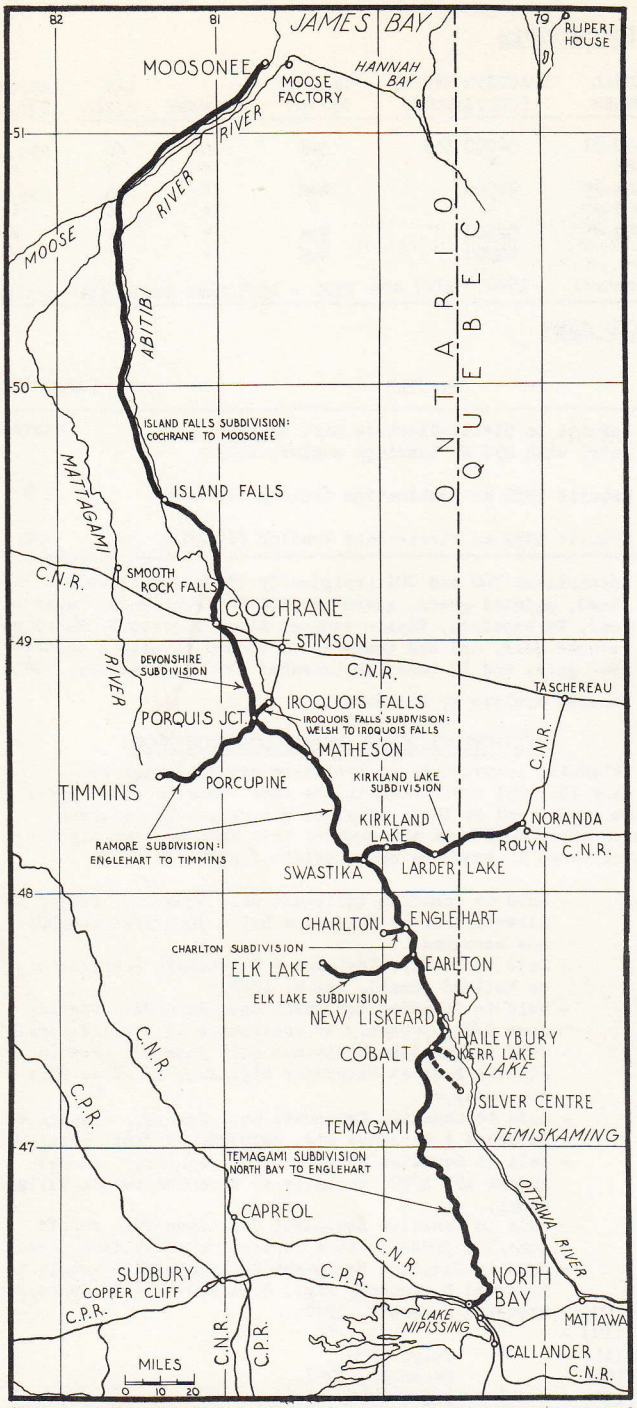
G. Locomotives 700 and 701 (originally 157 and 158) were streamlined, painted green, given new A.A.R. front ends, Baker valve gear, BK boosters, Elesco exhaust steam injectors, Barco power reverse gear, and had tenders lengthened to give a capacity of 8500 gals. and 13 tons, in December 1940 and January, 1941.

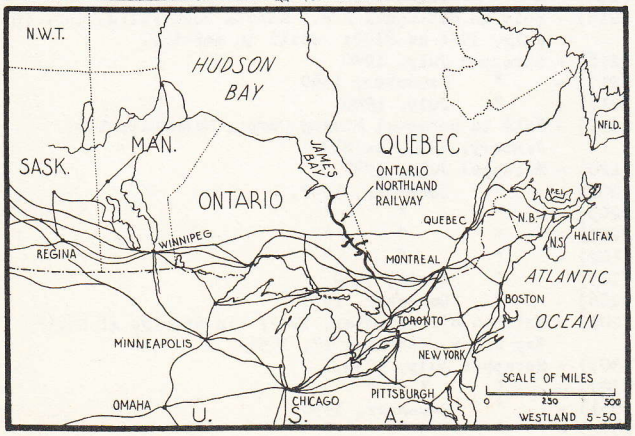
H. Booster applied by builder.

DISPOSITION OF STEAM LOCOMOTIVES

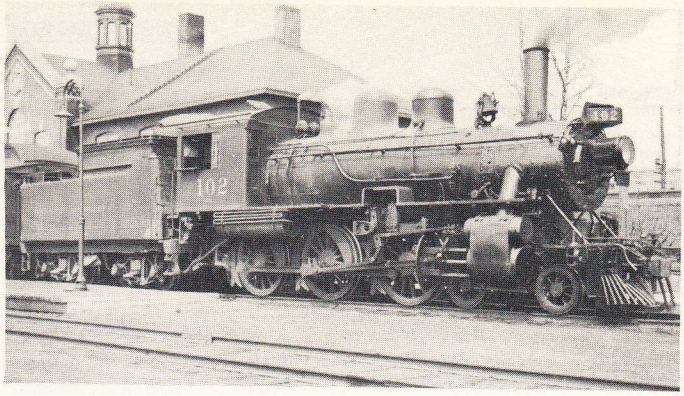
The following locomotives removed from service prior to February 15, 1951 are listed in the same order as they appear in the roster and by their original numbers. Locomotives removed after 1935 have the numbers that they bore at time of removal shown in brackets after original numbers.

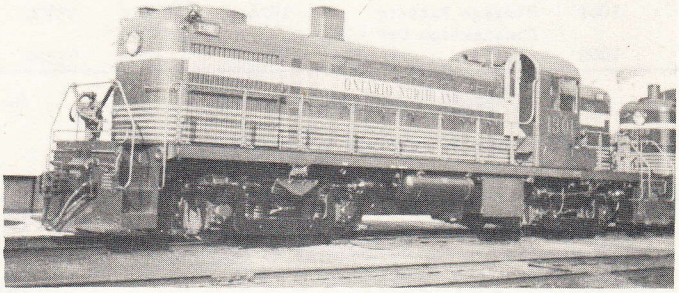
101 - Sold to Canadian Equipment Co., June/20; resold to Alberta & Great Waterways Rly., June 9/21 as #30; now scrapped.
102 - Sold to Baldry, Yerburgh & Hutchinson (contractors on Welland canal), May 8, 1914.
103 - Sold to Canadian Equipment Co., June/20; resold June 9/21, probably to contractor on Welland canal
104 - Sold to Canadian Equipment Co., June/20; resold to Alberta & Great Waterways Rly, Aug. 19/20 as #29; now scrapped.
105 - Sold to Canadian Equipment Co., June/20; resold to Roberval & Saguenay Rly, July/20, as #10; scrapped.
106 - Sold to Canadian Equipment Co., June/20; resold August 19, 1920, probably to a contractor on Welland canal.
107 - Sold to Canadian Equipment Co., June/20; resold June/20, probably to a contractor on Welland canal.
108 - Sold to Canadian Equipment Co., June/20; resold to Roberval & Saguenay Rly., Sept./20 as #11; scrapped.
109 (109) - Scrapped November, 1940.
110 (110) - " " "
111 (111) - " July, 1940.
112 (100) - " December, 1947.
114 (114) - " July, 1940.
115 (215) - Sold to Mattagami R.R., Smooth Rock Falls, Ont. in July, 1941 as #102; still in service.
116 (216) - Scrapped July, 1940
117 (217) - " December, 1940
118 (218) - " July, 1940
119 (219) - Sold to Normetal Mining Corp., Normetal, Que., January, 1938, as 219.
120 (220) - Scrapped July, 1940
123 (202) - " December, 1947.
124 (203) - " " "
126 (205) - " " "
127 (102) - " " "
128 (103) - " April, 1949
129 (206) - " December, 1947
132 (209) - Written off December, 1947; in storage at North Bay shops, February 15, 1951.
148 (307) - Scrapped July, 1940.
150 (309) - " " "
151 (851) - " December, 1940
152 (852) - " " "
153 (853) - Sold to Normetal Mining Corp., June, 1941 as #853, resold to Manitoba Paper Co., Pine Falls, Man., 1946.
154 (854) - Sold to Abitibi Power & Paper Co., Iroquois Falls, Ont., December, 1941, as #60; still in service.
1101 (1101) - Stored at North Bay shops for scrapping, Feb. 15/51.

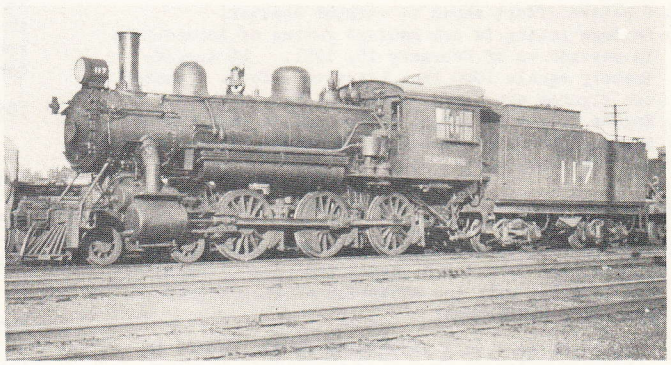


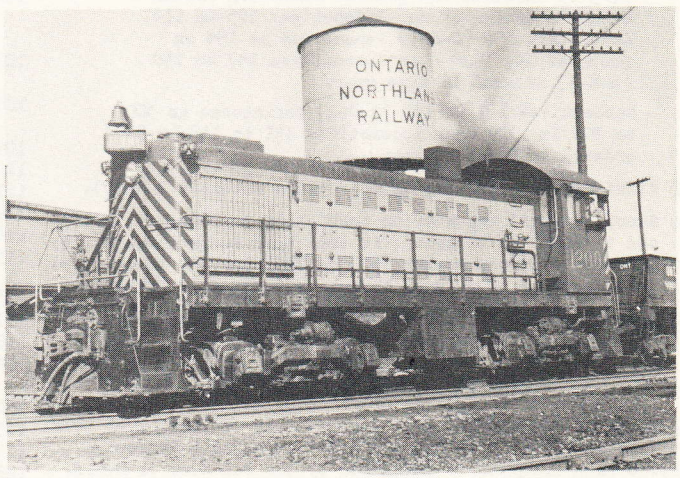


Detail and locational maps of Ontario Northland Railway









102 - (ex 127) at Cochrane station, hauling Cochrane - Porquis local
- J. Norman Lowe photo

1301 - 1500 h.p. road-switcher at North Bay roundhouse, July 19, 1943
- from Frank J. Bechtel

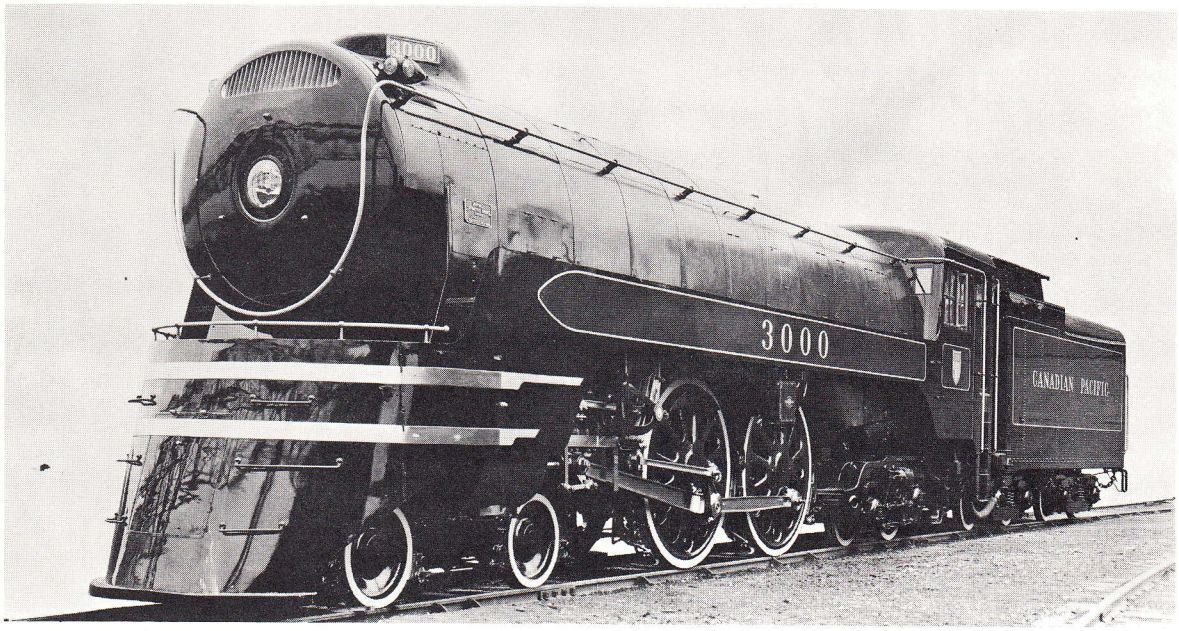
117 - (later 217) at North Bay, July, 1934
- James H. Allen photo

1200 - 1000 h.p. switcher in North Bay yards

ADDRESSES OF PHOTOGRAPH CONTRIBUTORS

James H. Allen, 67 Indian Rd. Cres., Toronto, Ont.
Frank J. Bechtel, 83 Water St. South, Galt, Ont.
John R. Lee, P.O. Box 115, Comber, Ont.
J. Norman Lowe, 4895 Walkley Ave., Apt. 17, N.D.G., Montreal, Que.

3000-3004



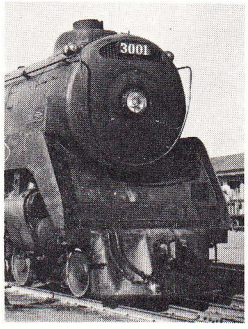
With the easing of the Depression by the mid-1930's and an upswing in the demand for fast, comfortable passenger train services came a locomotive design that was as unique as it was eye catching. The 4-4-4 wheel arrangement was rarely duplicated elsewhere, but on the CPR it accounted for some 25 units, all sired from these five class F-2-a's which were turned out by Montreal Locomotive Works in 1936. In honour of the 25th anniversary of the reign of King George V, the wheel arrangement was dubbed "Jubilee", although this class name was not recognized elsewhere.

At the same time, four lightweight 4-car trainsets consisting of a mail-express car, a baggage-buffet coach and two 36-seat coaches were built by the CP's own Angus Shops to complement the new engines in the high speed, medium distance services between Montreal and Quebec, Toronto and Windsor, and Calgary and Edmonton. Engines 3003 and 3004 were assigned to trains 349, 350, 351 and 352 out of Montreal; 3000 and 3002 were assigned to Nos. 37 and 38, the Royal York, out of Toronto and 3001 to Nos. 525 and 526, the Chinook, between Calgary and Edmonton.

The overall design of these engines was clean, without being austere. The streamlined boiler jacket enclosed everything -- boiler feed check valve, Elesco feedwater heater bundle, sand dome, safety valve and headlight. A heavy reinforced sloping steel shroud around the front end served as the pilot, and concealed the pivoted coupler, cylinders, an air reservoir and the bell, and was continued smoothly along the sides of the boiler at running board height to conceal another air reservoir, the reverse gear, air compressor and feedwater heater pump. The cab was a standard CP vestibule type but with rounded corners. Similarly, the tender styling was designed to harmonize with the coaches that trailed it, having rounded top corners to match the coach contour. The only projection above the boiler top was the cowled stack which also accommodated the illuminated engine number, the sand dome being fully shrouded by the planished steel boiler jacket. No steam dome was used; instead dry steam was collected by a slotted dry pipe developed on earlier CP engine designs and favoured on later designs as well. A smoke lifting device, consisting of an open grill on the smokebox jacket front and ducting through the stack cowling was originally fitted, but later eliminated.

Mechanically, these engines represented the best equipment and practices of the era. The boiler was entirely of nickel steel and carried the unusually high pressure of 300 p.s.i. With greater grate and total heating areas than a G-5 Pacific, but with smaller cylinder diameter, the F-2 was a long-winded steed, seldom taxing its steaming capacity, even on long fast runs. However, 80" boxpok drivers made them prone to slippage and they were seldom used on freight, save for the odd breaking-in run after overhauls.

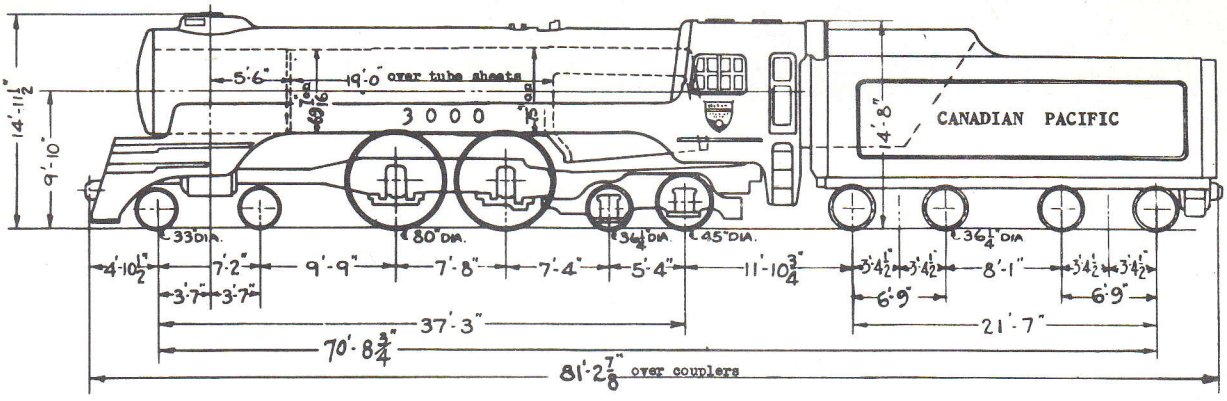
The engine and trailing trucks were General Steel types, fitted with SKF roller bearings. Similarly, main frames were GSC with cast crossties, the middle one serving as a bracket to carry the feedwater heater pump on one side and the air compressor on the other. This arrangement saved hanging these weights on the boiler, as was usually done, and simplified its construction. The rods were lightweight tandem type, with the main rod driving on the leading coupled axle, and the drivers being cross counterbalanced. Single bar Dean crosshead guides were fitted, with Walschaert valve motion and Barco power reverse gear applied.



LEFT: Collision damage resulted in the application of non-standard front end cowling to western-assigned 3001. This arrangement duplicates that of the 2910-series 4-4-4's.

4-4-4 - JUBILEE TYPE

CLASS F 2
SUB CLASS F 2 A
CAPACITY 27%



7000 Gal. Tender

AXLE SIZES Roller Bearings 9½"x14" 9½"x14" Roller Bearings Roller Bearings

SUB CLASS		F-2-a
BOILER PRESSURE	LBS./SQ.IN.	300
CYLINDERS		17-1/4"x 28"
DRIVING WHEELS		80"
TRACTIVE EFFORT	LBS.	26,600
FIREBOX WIDTH, INSIDE		70-3/16"
FIREBOX LENGTH, INSIDE		114-1/16"
GRATE AREA	SQ.FT.	56.6
ARCH TUBES, NUMBER & OUTSIDE DIAM.		4 3-1/2"
TUBES, NUMBER & OUTSIDE DIAM.		47 2-1/4"
FLUES, NUMBER & OUTSIDE DIAM.		120 3-1/2"
DISTANCE BETWEEN TUBE SHEETS		18' 10-13/16"
TUBE & FLUE HEATING SURFACE	SQ.FT.	2,601

FIREBOX HEATING SURFACE	SQ.FT.	198
ARCH TUBE HEATING SURFACE	SQ.FT.	34
FIRE HEATING SURFACE	SQ.FT.	2,833
SUPERHEATING SURFACE	SQ.FT.	1,100
COMBINED HEATING SURFACE	SQ.FT.	3,933
WEIGHT ON DRIVERS	LBS.	121,000
LOADED WEIGHT OF ENGINE	LBS.	263,000
LIGHT WEIGHT OF ENGINE	LBS.	244,000
LOADED WEIGHT OF TENDER	LBS.	198,500
LIGHT WEIGHT OF TENDER	LBS.	98,000
FUEL CAPACITY - COAL	TONS	12
WATER CAPACITY	IMP.GALS.	7,000
BUILDER & DATE	MONTREAL LOCOMOTIVE WORKS,	AUG., 1936

ABOVE: With RDC's in the consist, 3000 pilots eastbound train 630 through Hornby, Ont., in 1957. /W.H.N. Rossiter

The F-2-a's were splendidly proportioned and superbly finished. The boiler jacket was planished steel, while the smokebox jacket, pilot, running board skirts, cab and tender were painted black, except for Tuscan red panels on the skirts and cab and fender sides. Polished steel bands across the pilot and yellow hair striping around the red panels added the final touch of elegance to the paintwork.

The 4-4-4's performed as well as they looked. While seldom scheduled at over 60 m.p.h., they could make up lost time with ease. During a braking test a few months after it was built, 3000 hit an official speed of 112 m.p.h. on the Winchester Sub between Montreal and Smiths Falls! Their high-performance runs were soon checked, however, with the outbreak of World War II. They were assigned to heavier trains of second rate equipment on local runs, and had little chance to perform to their full capabilities. One exception was the Friday evening "Parliamentary Special", which used 3004 to speed one coach and one sleeper from Montreal West to Trois Rivieres, the train having come from Ottawa behind an F-1. After the war, the Jubilees again returned to the Royal York and the Chinook and lightweight equipment became the rule, rather than the exception. All was well until 1953, when the RDC began to displace the steam-hauled trains from intercity runs. However, the Jubilees had the final word on weekends when passenger loads exceeded the RDC's seating capacity; they simply hauled more coaches plus the idling RDC's as a train, much to the consternation of the Budd Company!

Nos. 3001, 3002 and 3003 were the first F-2-a's to be scrapped, in 1957, while 3000 continued to run on trains 634 and 635 between London and Windsor, Ontario. Meanwhile, 3004 was stored serviceable at Glen roundhouse in Montreal, and saw occasional service to Ottawa. It eventually replaced 3000 at London at the end of 1957, but only for a few months; it too was consigned to the scrap lines at Angus, and on November 17th, 1958 was cut up, ending 22 years of locomotive performance of the highest calibre.

Upper Canada Railway Society
BOX 122 TERMINAL "A" TORONTO
LOCOMOTIVE DATA SHEET
No. 6707

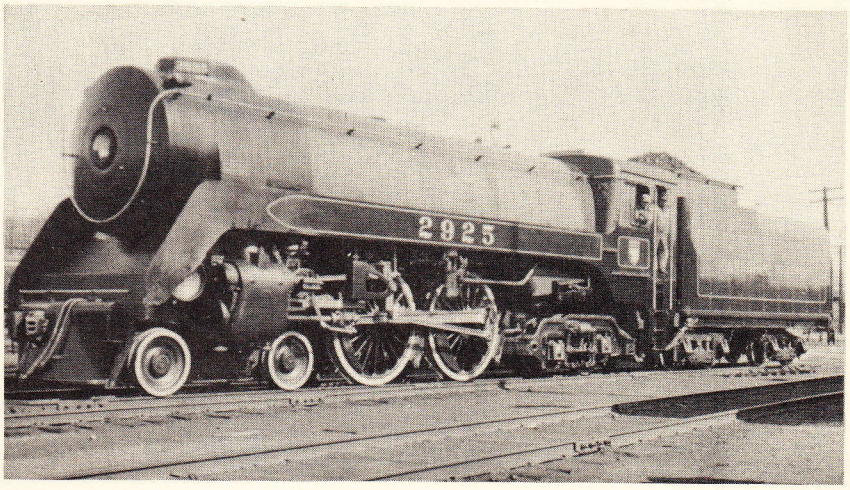
Compiled by: E.A. Jordan
Contributors: J.A. Brown, R.S. George, D.M. More, W.H.N. Rossiter.

2910-2929

BULLETIN #33

by F. H. Howard

The Canadian Pacific is typical of those railroads which carry on an extensive passenger business over a widespread but thinly-populated area, which traffic is transported in many relatively short trains. In the years following the onset of the depression, and until World War II, the term "relatively short" to the C.P.R. implied four or five cars, usually of wooden construction and constituting a trailing load of perhaps 300 tons. Such trains were headed by a variety of motive power, either ten-wheelers like D-6's, D-10's and E-5's or light Pacifics of the G-1 and G-2 classes, few of them younger than 25 years, and all of doubtful economy of operation and maintenance.



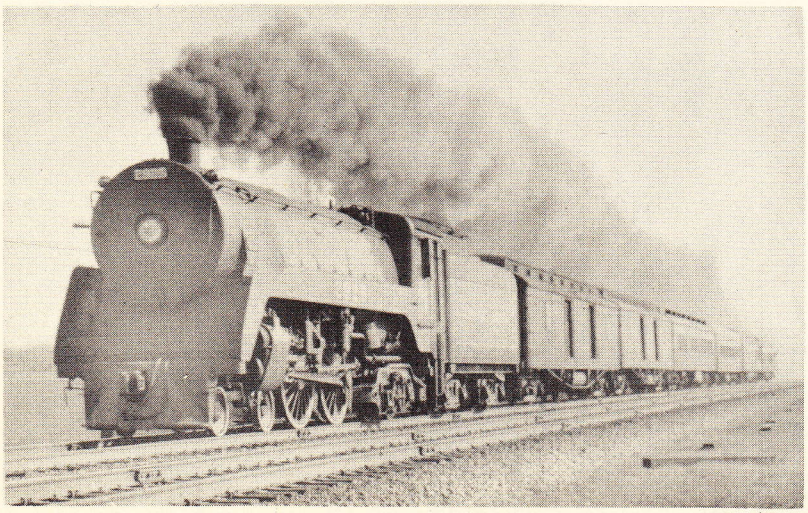
Photos by Fred Sankoff, 25 Botfield Ave., Toronto 18
JUBILEE TYPE 2925 AT WESTMOUNT, QUEBEC, APRIL 23, 1938

By 1937 the decision had been made to infuse the locomotive roster with some modern branch line or secondary passenger power. C.P.R. mechanical officers - carrying on a tradition of bold pioneering in such matters - had been pondering this problem for some time, and settled on a smaller version of the "Jubilee" type 4-4-4 engines built the previous year. Canadian Locomotive Co. Ltd. of Kingston was accordingly given a contract for 20 F-1 class locomotives, the first engines to be deliberately designed for limited tonnage in an era of bigger and still bigger motive power. In August of 1937, the author assisted in the laying down of number 2910 to inaugurate the series; it would have been numbered 2900 according to C.P.R. custom, if it had not been for a pair of old light Mountain-types bearing the numbers 2900 and 2901.

The F-1 was similar to its predecessors in having the same wheel arrangement and very high pressure (300 psi) boiler, small cylinders, front-end throttle, type E superheater, and no steam dome. However, it differed in other respects in view of its strictly local-train function. Its grate area being under 50 sq. ft., no stoker was applied, nor was power reverse gear fitted. A conventional slab-type frame was considered adequate, and the unconventional little feed water pump instead of a big compound one. That great boon to maintenance, the roller bearing, was applied to the engine truck, as was the case on every passenger locomotive built since 1928. A rather larger tender than the shrouded affair behind the first "Jubilee" was provided, and since the wheel-base was considerably shorter, the main rod drove on the trailing driver, the latter being a more conservative 75" in diameter.

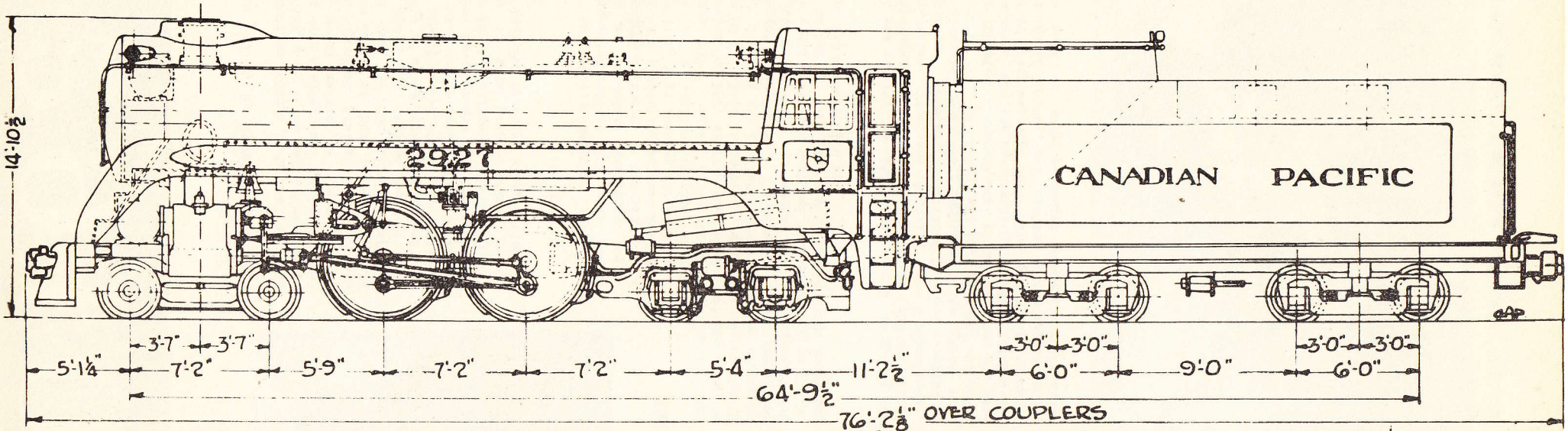
These engines, along with the Royal Hudsons built concurrently at Montreal, initiated the semi-streamlined fashion which was carried on for some years. They weigh 120 tons in working order, 56 tons of it resting on the drivers; this last figure is the third lowest of any class in the C.P.R. fleet, and is indicative of a most courageous venture into tailoring a locomotive to fit a particular job. Although their axle loading is relatively high, their low adhesive weight allows their use on almost any branch line. Their tractive effort is naturally low at 25,900 lb., and they develop 1262 drawbar horsepower at 40 m.p.h.

The F-1's occasionally are used in freight service, but usually on passenger trains. Fifteen of them are on the Western Region, mostly at Winnipeg and Moose Jaw, with the remainder at Toronto, Ottawa and McAdam. No. 2927 at Ottawa has been known to doublehead train no. 8 into Montreal in the days before no. 10 was added to relieve the load, and in summertime used to depart backwards at 4 a.m., with deadhead equipment, to Alcove on the Maniwaki branch, whence a daily except Sundays commuter train brought civil servants into the capital.

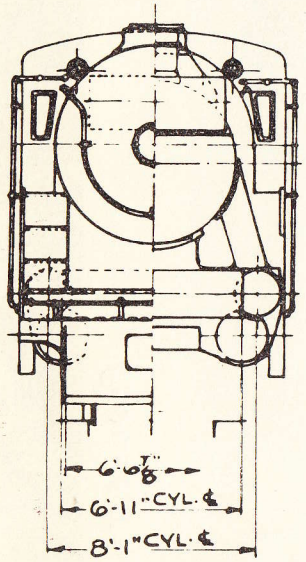


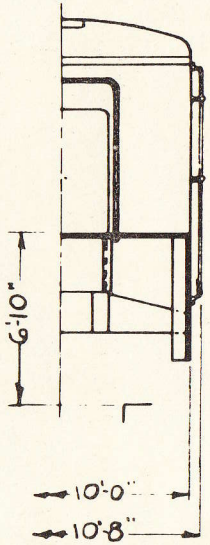
TRAIN 731 HEADED BY AN F-1-a AT BRONTE, ONT., MAY 1, 1948

By the spring of 1938, then, the C.P.R. owned all 25 locomotives of the "Jubilee" type, just about all the tendered 4-4-4's the world had ever seen or ever would see. The increase in passenger traffic occasioned by the war demanded locomotives of higher tractive effort, so the F-1's were not repeated, but the theory behind their design persisted right until the end of the steam period; and the Canadian Pacific can with credit point to them as evidence of their recognition that branchline power need not and indeed should not always be cast offs from the main line. In this it was virtually alone, among the railways of North America.



GRAPHIC 0 5 10 15 SCALE





CANADIAN PACIFIC

CLASS - F1-A

BOILER PRESSURE - 300 #/□"

CYLINDERS - 16½"×28"

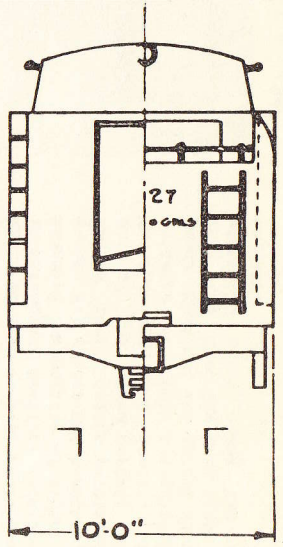
DRIVERS - 75" DIA.

LEADING TRUCK - 33" DIA.

LEADING TRAILER - 36" DIA.

TRAILING TRAILER - 45" DIA.

TENDER TRUCK - 36" DIA.



DRAWN BY G.A. PARKER

UPPER CANADA RAILWAY SOCIETY,
Box 122, Terminal "A",
Toronto, Ontario.

Bulletin 33, April, 1952

JOINT ISSUE

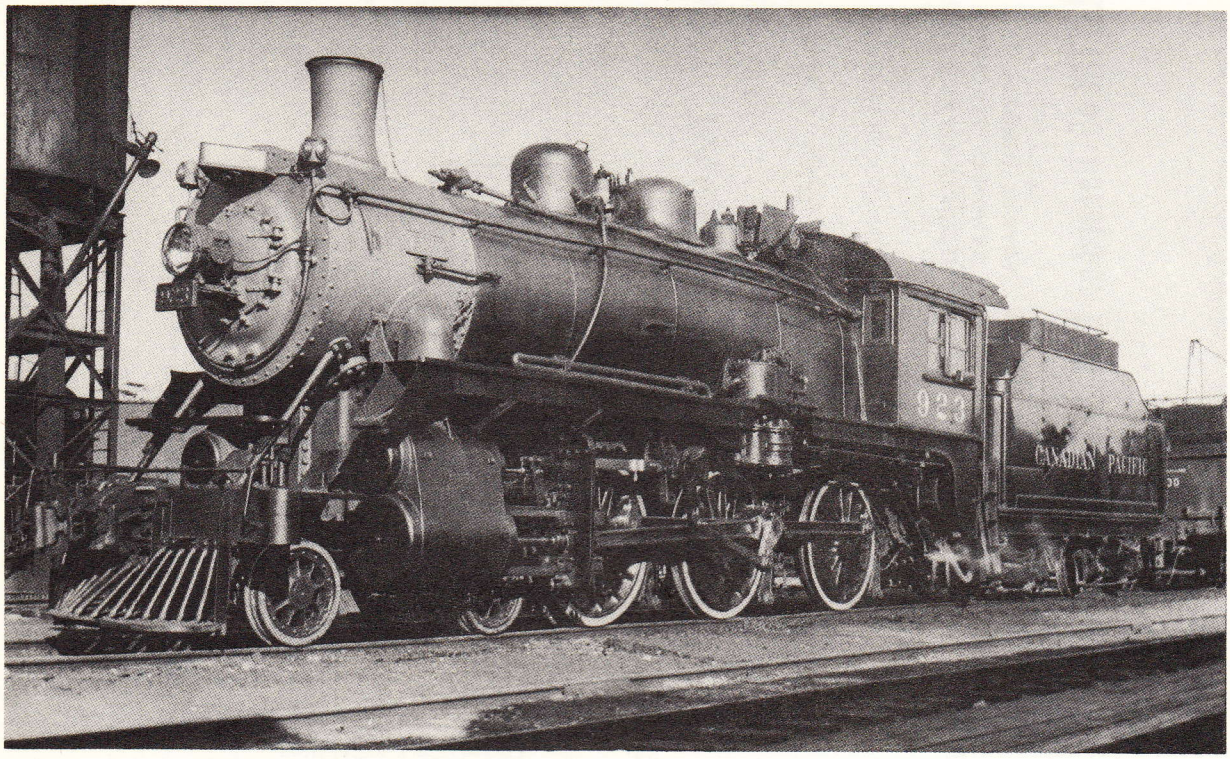
THE ONTARIO SOCIETY OF HO MODEL ENGINEERS,
R. Norman Collins, Hon. Secretary,
236 First Avenue, Toronto 8, Ontario.

Supplement to "THE QUILL", April, 1952

BULLETIN # 4

870-1111

4-6-0, CLASS D-10g,h,j & k.



CLASS	PRESENT NUMBERS	NUMBERS TO 1912	BUILDER	BUILDER'S NUMBERS	YEARS BUILT	CYLINDERS	DRIVERS	BOILER PRESSURE	ENGINE WEIGHT	TRACTIVE EFFORT
D-10g	870-894	2670-2694	Angus Shops	- - -	1910-1911	21x28"	63"	200#	198,000#	33,000#
"	895-912	2695-2712	Canadian	967-984	1911	"	"	"	"	"
"	913-933	2713-2733	Angus Shops	- - -	1910	"	"	"	"	"
"	934-948	2734-2748	Montreal	50247-50261	1911	"	"	"	"	"
"	949-961	2749-2761	Angus Shops	- - -	1911	"	"	"	"	"
D-10j	962-986	- - -	Montreal	51096-51120	1912	"	"	"	"	"
D-10h	987-1036	2762-2811	Montreal	50961-51010	1912	"	"	"	205,000	"
"	1037-1061	- - -	Montreal	52054-52078	1912	"	"	"	"	"
D-10k	1062-1086	- - -	Schenectady	52099-52123	1912	"	"	"	198,000	"
D-10h	1087-1111	- - -	Canadian	1123-1147	1913	"	"	"	205,000	"

TRANSFERRED TO QUEBEC CENTRAL RAILWAY:

873 retaining CP number, in 1938
878 as Quebec Central 56 in 1921
893 retaining CP number, in 1938
940 as Quebec Central 57 in 1921
948 retaining CP number, in 1938

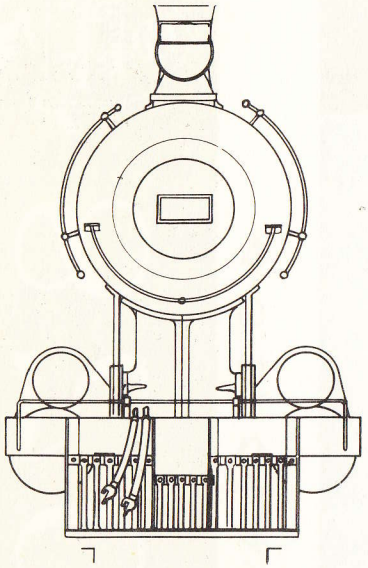
TRANSFERRED TO DOMINION ATLANTIC RAILWAY:

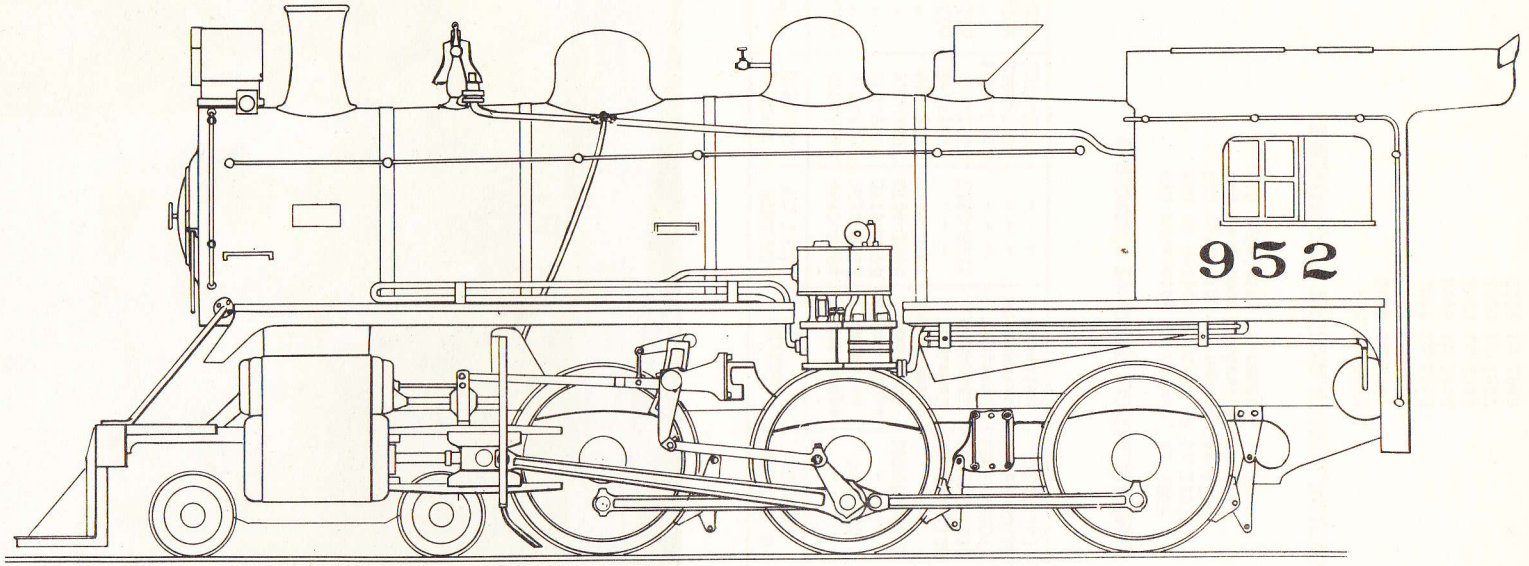
999 in 1937
1018 in 1937
1041 in 1937
1077 in 1949
1079 in 1949
1089 in 1940
1090 in 1937
1092 in 1940

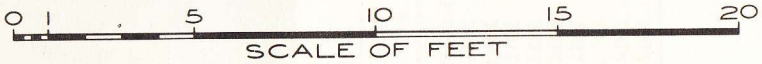
These engines kept their CP numbers on the DAR.

SCRAPPINGS BY YEARS:

1928 - 951
1936 - 1070
1939 - 1076
1940 - 1016
1944 - 1099
1945 - 1034
1946 - 968
1947 - 878, 883, 884, 885
1948 - 920, 959, 982, 1062, 1107
1949 - 907
1950-51 - 910, 965, 984, 985, 1069
1952 - 906, 932
1954 - 903, 960, 1008, 1031, 1090
1955 - 873, 874, 875, 881, 889, 898, 900, 901, 917, 919, 921, 938, 940, 943, 947, 950, 957, 958, 967, 997, 1000, 1001, 1028, 1037, 1053, 1058, 1065, 1089, 1091, 1093, 1103.





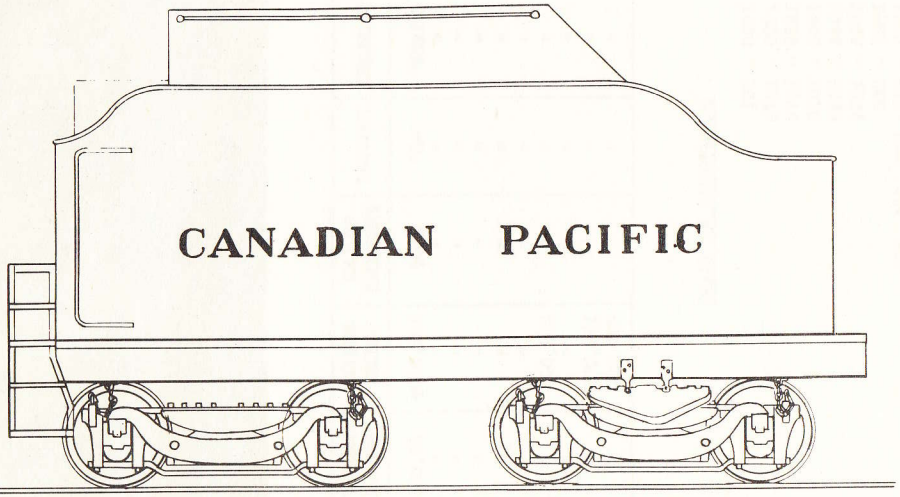


CANADIAN PACIFIC

RAILWAY

4-6-0 NO. 952

DRAWN BY B. M. HEADFORD



Upper Canada Railway Society
BOX 122, TERMINAL "A"
TORONTO, CANADA

BULLETIN 45 · December 1956

BULLETIN #50

SIR ADAM BECK
AND THE
HYDRO RADIAL PROPOSALS

by JOHN F. DUE

Sir Adam Beck is remembered today primarily as the founder of the Ontario Hydro-Electric System, but his interest in electricity was not confined to electric power as such; it extended to its use as a source of power for railways. During the period between 1912 and 1922, he developed and fought strenuously for plans for a system of radial electric railways in Ontario, centering on Toronto, which would have given the province one of the most modern passenger transport systems of the period. Unfortunately, as events developed, for the most part the building of the lines would have proven to have been a colossal blunder, but portions of several of them, if retained, would have aided materially in the solving of Toronto's present day traffic problems. While the traditional Ontario term of "radials" was used (this term has never been widely used with reference to electric railways outside Ontario), these lines were not to be interurbans of the typical variety, but were planned as high speed lines built to very high standards. The prototypes were the Chicago area roads, and, later, the International Railway's high speed line from Buffalo to Niagara Falls (completed in 1917), one of the best lines ever constructed in the United States.

Unfortunately (or perhaps fortunately), the radial plans became bogged down in a morass of political indecision and dispute so protracted that construction was delayed to a time at which it became evident that the lines could not be self supporting. The question became a major political issue, and the whole project became so confused that it is difficult to piece together the exact sequence of events; it became also a source of bitter recriminations which were to do serious harm to the prestige of Sir Adam Beck himself. In some ways, the history of the radial projects is highly reminiscent of current discussions of additional rapid transit facilities in Toronto - endless surveys, continuing disputes between various groups and persons involved, changes in plans, and inaction.

The Background

By way of introduction to the story of the radials, it is necessary to note briefly the picture of the interurban network of 1912. In the states directly south of Ontario there had developed between 1895 and 1912 a tremendous network of interurban lines connecting most of the major cities and towns. Ohio had about 2800 miles of line, Indiana 2000, and Michigan, Illinois, Pennsylvania and New York, although less completely blanketed, had very substantial mileages. The interurban had become a serious competitor of the steam railroad in the short haul passenger field, although most midwest lines handled only limited freight business. By contrast, western Ontario, in many respects similiar to the area south of the lakes, had only a group of isolated lines, totalling about 360 miles (between 1912 and 1918 an additional 120 miles were completed or electrified, but 45 miles were abandoned). These lines can be outlined briefly:

1. The Windsor roads: lines owned by the Detroit United System extended to Tecumseh and to Amherstburg, and the Windsor, Essex and Lake Shore reached Leamington.

2. The Chatham, Wallaceburg and Lake Erie operated three lines out of Chatham: to Wallaceburg, to Painscourt, and to Erie Beach.

3. The London lines: the London and Lake Erie operated from London via Lambeth to St.Thomas and Port Stanley, paralleling the city-owned steam-operated London and Port Stanley, which was later (1915) electrified by Sir Adam Beck. The Woodstock, Thames Valley and Ingersoll operated between the two cities of its corporate name, but never reached London, as planned.

4. The Grand Valley lines: the Grand River, which became a Canadian Pacific affiliate, operated from Galt to Waterloo via Kitchener (known as Berlin before 1916); and the Grand Valley extended from Brantford via Paris and St. George to Galt. In 1915 another Canadian Pacific affiliate, the Lake Erie and Northern, completed its line from Galt to Brantford and Port Dover; it acquired from the city of Brantford the property of the Grand Valley above Paris, but did not use it; the city continued for some years to operate the Brantford-Paris line of the GV paralleling the LE&N.

5. The Hamilton lines, all owned by the Dominion Power and Transmission Co., extending outward from Hamilton to Oakville (Hamilton Radial), to Brantford (Brantford and Hamilton), and to Beamsville (Hamilton, Grimsby and Beamsville).

6. The Mackenzie lines: two of these were owned, technically, by the Canadian Northern: the Niagara, St.Catharines and Toronto, serving major points in the Niagara Peninsula, and the Toronto Suburban, which ultimately reached Guelph from Toronto, but as of 1912 extended only to Lambton and to Weston (the Weston line was extended to Woodbridge in 1914).
The other Mackenzie system was the Toronto and York Radial, with one interurban line to Lake Simcoe points, and two suburban lines, one extending into Scarborough terminating at West Hill, and the other from Sunnyside to Port Credit. None of these reached downtown Toronto, but terminated in the outskirts.

Apart from these roads there was only one other interurban in Ontario, the remote Nipissing Central, which connected Cobalt with New Liskeard. There were several suburban car lines.

Plans for Hydro Radials 1912-1917

In the period from 1905 to 1912, the Ontario Hydro-Electric Power System had developed rapidly, establishing itself against strong opposition as the first major successful public power project in North America, and by undertaking rev-

olutionary changes in power production and distribution had greatly reduced costs of power and brought rapid electrification of farms and small towns. The driving force behind Hydro was Sir Adam Beck, successful manufacturer, former Mayor of London and a member of the Conservative cabinet of the province, a man of great forsight and dynamic drive, if somewhat arrogant and quarrelsome, and characterized by some as ruthless in treatment of both enemies (of which he had many) and friends alike. Beck had a great personal following among the people of the province, but also a great capacity for antagonizing colleagues and provincial Premiers.

With the Hydro system securely on its feet, although by no means completed, Beck's attention turned to the development, under Hydro sponsorship, of a system of electric railways, which was designed to provide south central and western Ontario with a network of interurbans even superior to that of Ohio. Beck first publicly endorsed the development of a system of radials in 1912, pointing out that Hydro offered both rights of way and a source of power, and that the proposed system could bring great transportation advantages to both farmers and city dwellers.

In 1913 definite plans for Hydro radials commenced to take shape. The first serious proposal came from municipalities east of Toronto, for a line from Toronto to Markham, and thence to Uxbridge and to Port Perry via Brooklin. An additional line from Whitby to Brooklin was later added to the plan. The Hydro staff conducted an extensive survey of this line, the report being issued in November. Cities of western Ontario also commenced to show interest in a line from Toronto to Sarnia. In 1914, the basic legislation authorizing the building of radial lines was enacted, under the name of the Hydro Electric Railway Act of 1914. Briefly, it authorized the construction of electric railways in territory served by Ontario Hydro, through cooperative arrangements between Hydro and the municipalities involved. Steps in the procedure for the development and operation of the lines were as follows:

1. Upon request from municipalities in the area, Hydro would conduct a survey of the proposed line, estimating cost of construction, revenue, etc., and make a report, indicating, in the report, the allocated share of the construction cost for each municipality involved.

2. Each municipality would then submit to its voters a by-law approving participation in the project and providing for the issuance of debentures by the municipality for the allocated share of cost.

3. Approval of the agreements between Hydro and the municipalities by the province.

4. Financing of construction by the issuance of bonds by Hydro, secured in full by the municipal debentures. Provincial guarantee of the bonds was sought by Hydro.

5. Undertaking of construction by Hydro.

6. Operation of the line by Hydro, which retained power over rates, services, etc.

7. Meeting of any deficits by the municipalities.

Beck made it very clear that Hydro would approve only those projects which appeared to be self-supporting, and that any deficits would be borne by the municipalities, not the Hydro or the province.

During 1914 interest in the plans increased, particularly in western Ontario and the Georgian Bay area. Hydro made a detailed survey of electrification of the London and Port Stanley as approved by the voters of London in 1913, conducted other surveys of western Ontario lines, and encouraged local meetings to discuss the radials. In October of 1914 the plans for the lines east of Toronto were approved by the voters of 11 of the 13 municipalities involved (all except Uxbridge and Newmarket). Hydro proceeded with plans for these lines, and sought Federal subsidy.

In March of 1915 a large number of municipalities formed the Hydro Electric Railway Association of Ontario (under Hydro sponsorship) to further the development of the systems. The Association actively sought a provincial subsidy for the lines. Premier Hearst promised careful attention to the request, indicating that he favored the radial development but questioned the desirability of a subsidy. The Association and its various regional locals worked hard for the program and throughout western and central Ontario the question received extensive popular discussion.

throughout western and central Ontario the question received extensive popular discussion. By 1916 some 2100 miles of line had been proposed.

The next system to be submitted to vote by the municipalities involved (on Jan. 1, 1916) was the line extending from Toronto via Port Credit and Guelph to London, and, eventually, Sarnia (the London - Sarnia segment not being voted on at this time). Only Berlin and 3 small townships rejected the proposal. Beck still pushed for a subsidy, and sought provincial approval to go ahead with the plans. In April, however, the government warned that it had not approved the contracts with the municipalities on the London line, and that it would not encourage expenditures on radials during the war. The Radial Association complained, but, nevertheless, later in the year the government amended the 1914 Act to prohibit further expenditures on radials until the war was over. Thus action was stymied temporarily, but work on the plans continued. The Federal government informally promised a subsidy if one was given by the province.

Plans for a third system were worked out in detail and submitted to the voters involved in January of 1917. This involved two lines, one extending from a junction with the proposed London line at Port Credit via Hamilton to St.Catharines, and another from Welland to Bridgeburg via Fort Erie. Hydro had in mind ultimate acquisition of the Niagara, St.Catharines and Toronto, which would link these two segments. All municipalities approved the Bridgeburg line, but three, including Hamilton city plus Nelson and Saltfleet townships, rejected the St.Catharines line proposal.

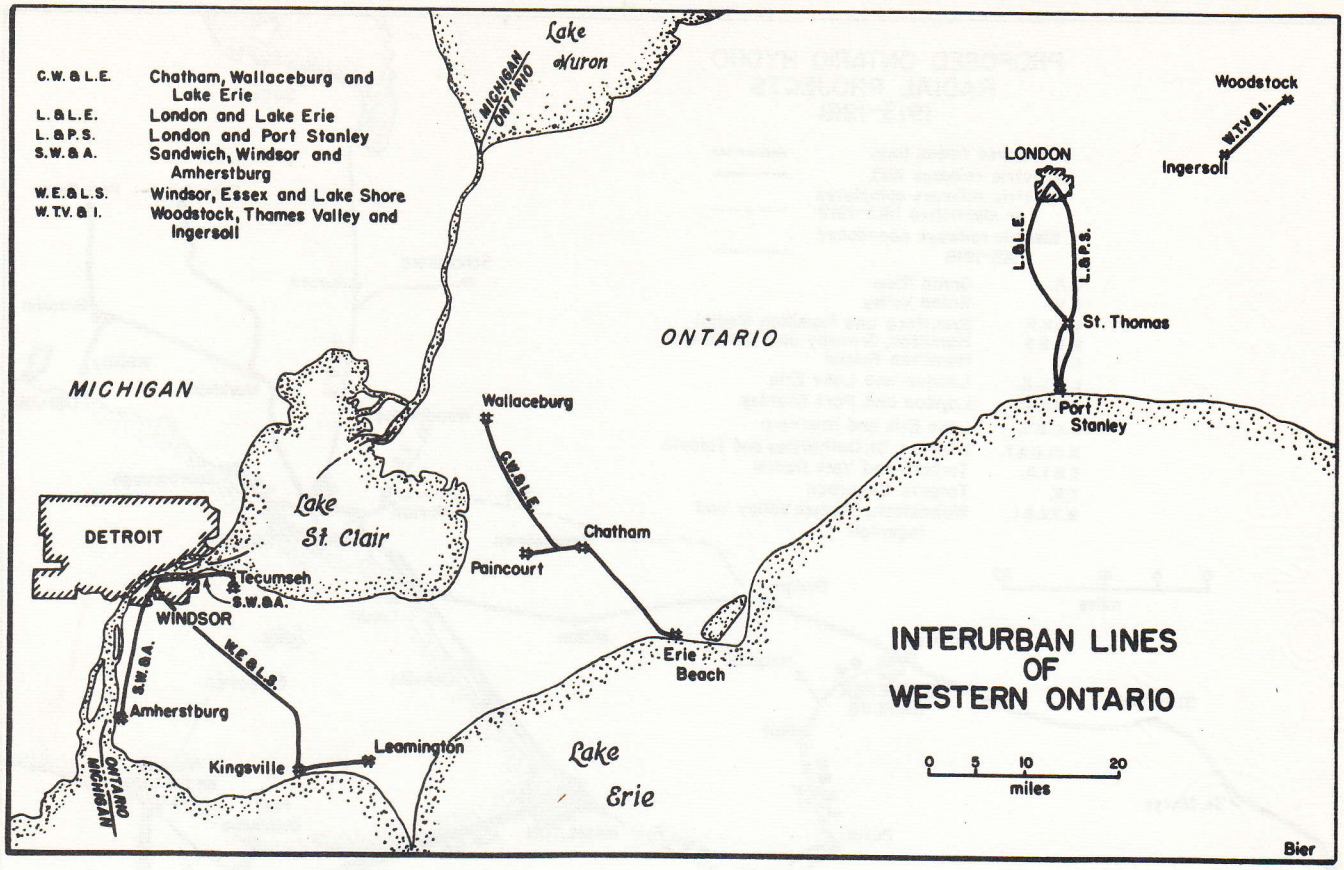
During the remainder of the war years, activity was confined to more detailed work on the plans for these three lines.

Postwar Changes in the Plans

During the war years, several developments occurred which resulted in substantial shifting of emphasis in the projects. One was the completion by the Toronto Suburban in 1917 of its line from Toronto to Guelph, duplicating the projected line to Guelph via Port Credit. A second was the undertaking by the Canadian Northern of the building of the Toronto and Eastern. This ill-conceived venture was an electric line extending from Toronto to Bowmanville via Oshawa, running along Kingston Road (now Highway #2) for much of its length. This road was undertaken in order to lessen the opposition of Oshawa and other cities to the fact that the Canadian Northern's main line was built several miles north of these cities to minimize grades. To some extent this line would serve the same territory as the proposed eastern radial lines.

The third development was the purchase by the Dominion government in 1917 of the Mackenzie-owned Canadian Northern, bankrupted by its ex-

BU #50



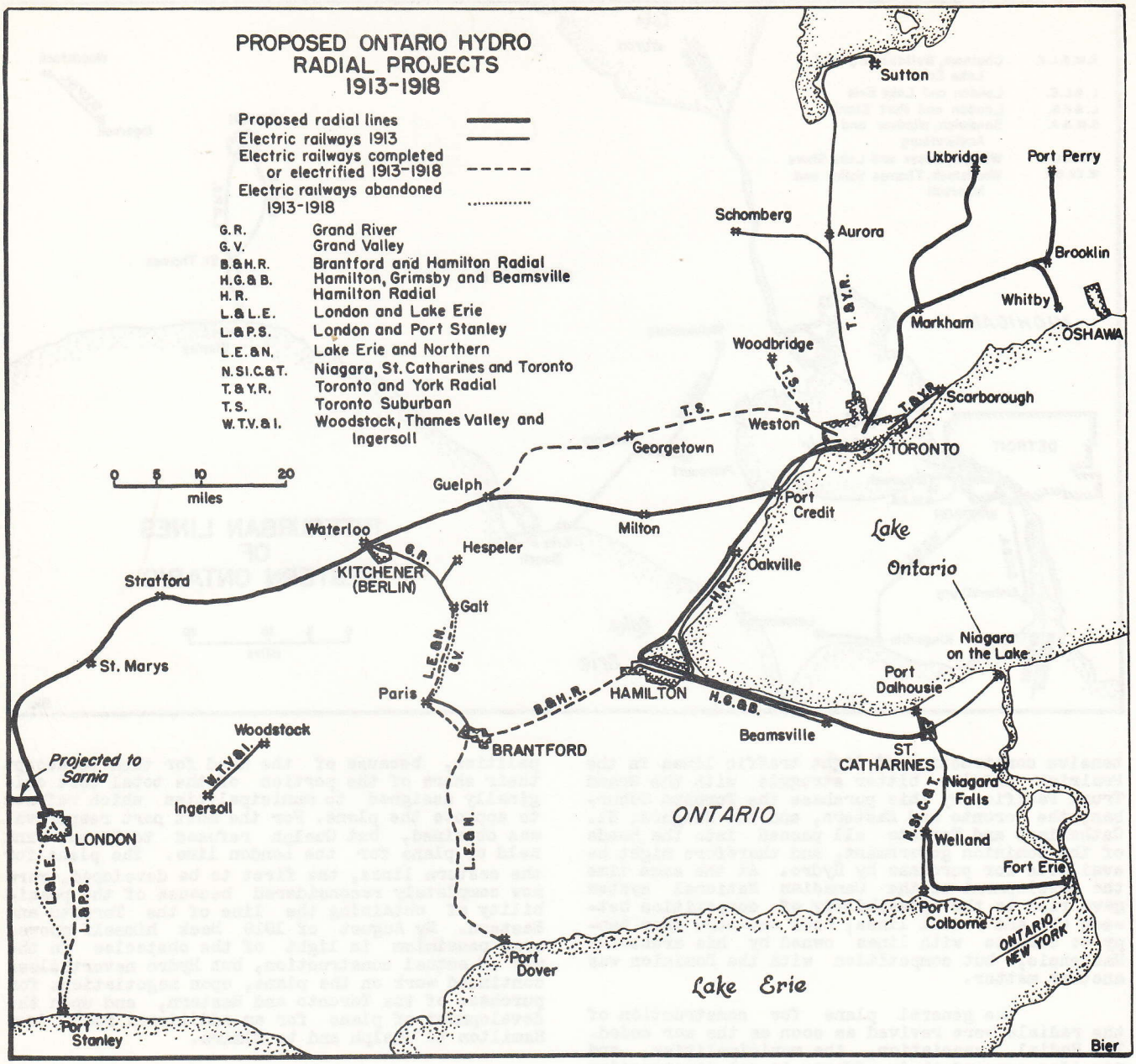
tensive construction of light traffic lines in the Prairies and its bitter struggle with the Grand Trunk Pacific. By this purchase the Toronto Suburban, the Toronto and Eastern, and the Niagara, St. Catharines and Toronto all passed into the hands of the Dominion government, and therefore might be available for purchase by Hydro. At the same time the development of the Canadian National system gave rise to the possibility of competition between CNR and radial lines; Beck was more than happy to compete with lines owned by his archenemy Mackenzie, but competition with the Dominion was another matter.

The general plans for construction of the radials were revived as soon as the war ended. The Radial Association, the municipalities, and Sir Adam renewed their efforts to get construction under way. Apart from the need for revision of plan for reasons noted above, there were two immediate obstacles: the failure of a few municipalities to approve the projects, and the hesitancy of the provincial government to approve the agreements and to provide subsidy, guarantee of the bonds, or both. Neither subsidy or guarantee were essential, but would have greatly facilitated financing. The position of the province was by no means clear; it had approved the 1915 agreements on the Port Perry line and had made commitments on the St. Catharines line, but showed considerable reluctance to take any positive steps to aid in the initiation of construction.

Some progress was made in tackling these obstacles. A revote in Hamilton carried by a 2 to 1 margin, and Nelson likewise approved; only Saltfleet again rejected participation in the St.Catharines line. Other cities involved proceeded to issue debentures and deposit them with Hydro, a step which they would later bitterly regret. The government cooperated to the extent of repealing the 1916 Act, thus permitting the initiation of the projects, but it was still reluctant to make the guarantee of the bonds, despite Beck's pleas, and it compelled resubmission of both the London and St. Catharines projects to vote by the municipalities, because of the need for them to accept their share of the portion of the total cost originally assigned to municipalities which refused to approve the plans. For the most part reapproval was obtained, but Guelph refused to do so, and held up plans for the London line. The plans for the eastern lines, the first to be developed, were now completely reconsidered because of the possibility of obtaining the line of the Toronto and Eastern. By August of 1919 Beck himself showed some pessimism in light of the obstacles in the way of actual construction, but Hydro nevertheless continued work on the plans, upon negotiations for purchase of the Toronto and Eastern, and upon the development of plans for an additional route from Hamilton to Guelph and to Elmira.

In the Fall elections, the radial plans were dealt a serious blow, when the United Farmers party of E.C.Drury defeated the Hearst government. While Hearst had not been enthusiastic about the radial plans he had not opposed them and in a pre-election speech stated that he favoured building the lines; he would simply not push them or provide provincial subsidy. But Drury was known to be very skeptical, and the United Farmers Association had indicated by a resolution that it viewed the radial plans with alarm, and urged the Legislature to go slowly. Drury, however, in December of 1919, indicated that there was no friction between himself and Sir Adam Beck (although relations could hardly have been called cordial), but went on to point out that the establishment of the Canadian National had altered the situation materially, and necessitated careful reconsideration of the plans.

Hydro, nevertheless, went forward with the plans, but now shifted emphasis from the three original projects to ones of more limited regional scope, and involving greater use of existing lines in the areas. The Port Perry project was replaced by one calling for completion of the Toronto and Eastern; the London line was shelved in favor of the Hamilton - Elmira line and acquisition of the Toronto Suburban; the Toronto - St.Catharines line was included in the project and supplemented by a



plan for acquisition of the Niagara, St.Catharines and Toronto.

On January 1, 1920 the Hamilton - Elmira line was submitted to the voters, and all municipalities except West Flamboro approved it. By February all municipalities involved in the Toronto and Eastern acquisition had approved the plan (although it was later discovered that an insufficient number of persons had voted in York). In June, Drury assured the municipalities that a provincial guarantee of bonds would be forthcoming once he was convinced that there would be no duplication with present lines and that the radials would be self-supporting.

In the same month Beck obtained a tentative option from the Dominion on the three roads which the Canadian National had inherited from the Canadian Northern - the Toronto Suburban, the Toronto and Eastern, and the Niagara, St. Catharines and Toronto, and requested provincial approval of the purchase. On July 6, Drury flatly refused to give his approval, and announced the appointment of a Commission to make an inquiry into the radial plans, indicating in detail his reasons for doing so - the heavy Hydro borrowing for other purposes, the financial difficulties of electric lines in the U.S., the development of the CNR, and the highway construction program. Beck bitterly protested, pointing out the commitments already made by the province in validating bonds and approving agreements. But all action was stopped pending report of the Commission.

The Sutherland Commission

The Commission, which consisted of five members, none of whom had any direct experience with the electric railway industry, was known

The Commission, which consisted of five members, none of whom had any direct experience with the electric railway industry, was known as the Sutherland Commission, for its chairman, Mr. Justice Sutherland. Attention was concentrated on the network planned for immediate development, which included about 325 miles, only 125 miles of which involved completely new construction. There would be five lines in the initial system:

1. The Toronto and Eastern, which would

be acquired and completed to downtown Toronto via the east Don Valley and the waterfront. As of 1917 the T & E had completed grading from Bowmanville to Pickering, and had laid rails from Bowmanville as far as Whitby. No overhead had been installed, and no cars had operated as yet. The Dominion government stopped construction completely when it had acquired the road in 1917 and no additional work had been done.

2. The Toronto, Port Credit and St.Catharines, to be built from Toronto via Hamilton to St. Catharines, 72 miles. The route would follow the Toronto waterfront, pass through the CNE grounds to Sunnyside, and thence extend through Port Credit, Oakville and Hamilton (along Grand Trunk right of way in the latter city) to St.Catharines. Two alternate plans were proposed, one involving use of the existing Hamilton-Oakville and Hamilton-Grimsby lines of the Dominion Power and Transmission Company, the other involving new lines paralleling these if Dominion Power would not sell them at acceptable figures.

3. The Niagara Central, to be formed through acquisition from the Dominion government of the Niagara, St. Catharines and Toronto. Some modernization of this property, which connected St. Catharines with Port Dalhousie, Port Colborne, Niagara Falls, and Niagara-on-the-Lake, was planned. These lines would provide a connection with the New York lines.

4. Hamilton-Galt-Kitchener-Elmira line. A new line would be constructed from Hamilton via Copetown to Galt, and the Grand Trunk line from Galt to Elmira via Kitchener acquired and electrified, as well as the Grand Trunk line from Preston to Guelph.

5. The Toronto Suburban, another existing interurban which had fallen into Dominion government hands along with its parent Canadian Northern, would be acquired. This route extended from Toronto to Guelph, with another line to Weston and Woodbridge, but lacked a good entrance into Toronto; under the plans it would be brought to Sunnyside in part via the old Belt Line, and thence into the downtown area via the proposed harbour line.

As the formal plan was developed, it made no provision for inclusion of the Yonge St. line to Lake Simcoe, owned by the Mackenzie interests, the Hamilton-Brantford Radial, or the Canadian Pacific electric lines in the Grand Valley. However, the plan was regarded only as an initial one; not only might other existing routes be included, but additions were planned, including a Kitchener - London line, once the initial pattern proved successful.

Several features of the proposed routes were stressed:

1. All lines would be built or rebuilt to high standards, with 80 pound rail and private right of way operation, patterned after the International Railway's new high speed line from Niagara Falls to Buffalo.

2. The importance of a high-speed entrance into downtown Toronto was recognized, with plans for utilizing a right of way along the harbour. Initial plans called for a terminal at the foot of Bay Street but were revised to include a subway up Bay Street to Queen, in the heart of the downtown area.

3. Both freight and passenger service would be provided, with development of through carload freight in conjunction with connecting steam lines.

The Commission undertook a very careful study of the project over a ten month period, compiling some 27 volumes of evidence, and publishing in 1921 a report of 250 pages. Testimony was obtained from a wide range of persons, including a number of interurban officials in the United States. In order to strengthen its case, Hydro had during 1920 employed Bion J. Arnold, perhaps the best known electric railway consultant in the United States, to make a survey of the project. While he disagreed with some of the cost and revenue data, and suggested the extension of the lines up Bay Street from the waterfront via a subway, he endorsed the project, indicating that it would be self-supporting.

Despite the Arnold endorsement, the Sutherland Commission concluded that the development of the proposed system was unwarranted. Specifically, the report noted the following:

1. The financial condition of electric railways in both Canada and the United States was so unsatisfactory and the future appeared so bad that the radials should not be built unless there was strong evidence that they would be self-supporting, particularly in light of the fact that new roads would cost much more to build than present ones. Virtually no new lines were being built in the United States.

2. No evidence of such self-support could be presented; the Commission believed that Hydro had underestimated operating costs and overestimated potential revenues.

3. The new lines would in part compete with the Canadian National system.

4. Heavy expenditures on the Chippawa hydro-electric project made it particularly unwise for the province to guarantee $45 million of radial bonds, and municipal debt had grown rapidly.

5. Provincial endorsement of the bonds would set a dangerous precedent, leading to demand for additional support from the province for other local projects, radial and otherwise.

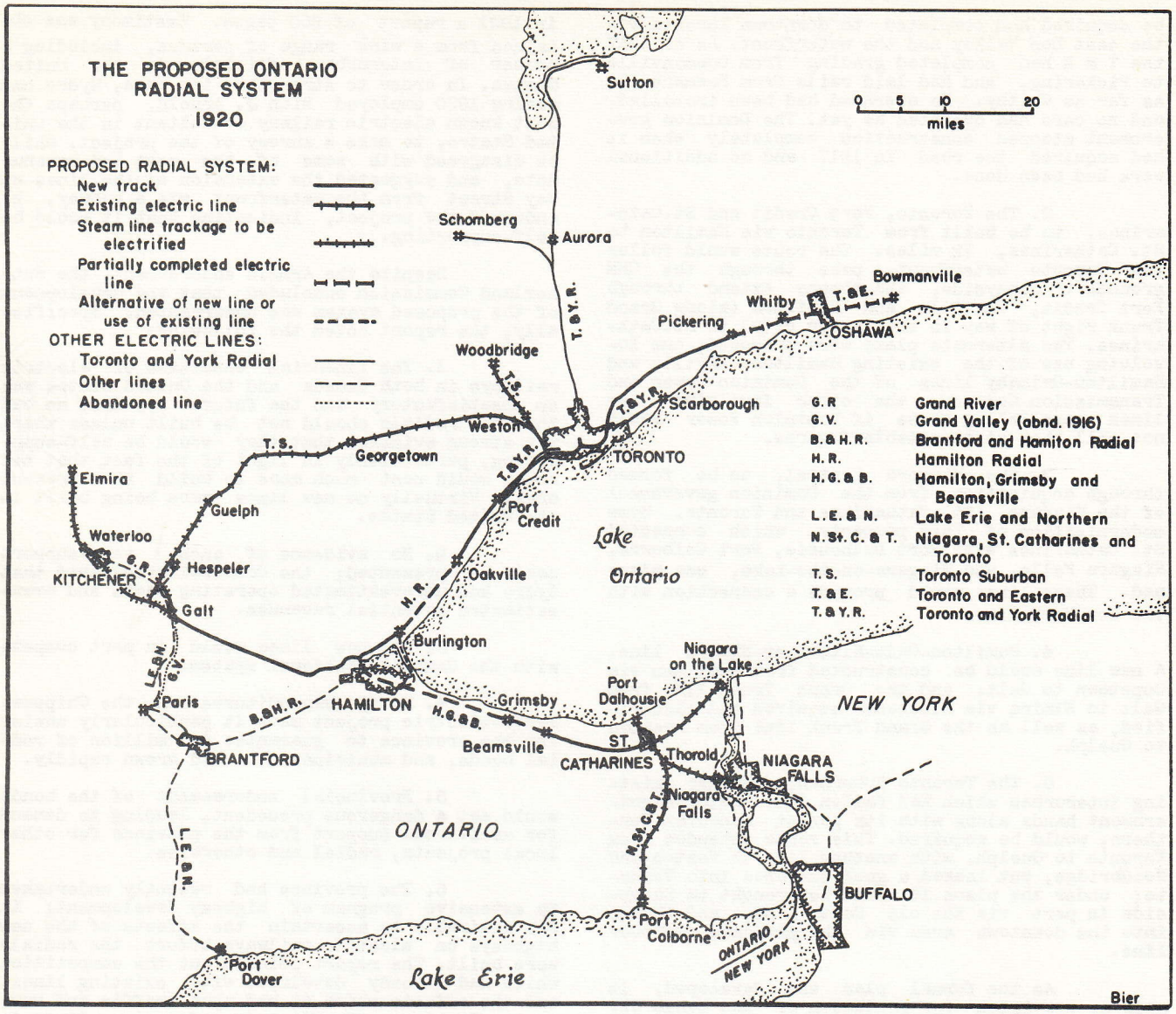
6. The province had recently undertaken an extensive program of highway development; it was desirable to ascertain the effects of the new highways on electric railways before the radials were built. The report pointed out the competition which had already developed with existing lines, and the effects which it had upon traffic and revenue. Testimony of officials of various lines in the United States was very convincing on this score.

Apart from the general conclusions, the Commission criticized Hydro for its failure to obtain the assistance of men experienced in the electric railway field in making its estimates of costs and revenues, and condemned the close relationship between Hydro and the Radial Association formed by municipal officials.

The Commission did note, however, that some circumstances were favorable to the proposals, particularly the limited passenger service in the area, and the high standards proposed for the lines, with a high speed entrance into Toronto.

While condemning the general plan, the Report called attention to the fact that the portion of the plan involving lines into downtown Toronto from suburban areas offered significant advantages, but suggested that they should be developed by the city in conjunction with the Toronto transit system, not as a separate project under Hydro control. On the basis of proposals made by one of the witnesses, Vice President F.P. Gutelius of the Delaware, Lackawanna and Western (a former Canadian Government Railways official in the Maritimes) the report offered the following suggestions for such a limited system:

1. A portion of the Toronto and Eastern right of way would be used to bring a suburban



rapid transit line from the east into the city; the inner portion of the line would follow the east Don Valley and the waterfront to Bay Street.

2. The existing Port Credit line would be brought into the downtown area via the proposed waterfront rapid transit route from Sunnyside.

3. The Toronto Suburban would be brought down the Humber to connect with the Port Credit line at Sunnyside.

4. The Toronto and York Radial's line to Lake Simcoe would be brought downtown via Sunnyside, or via a connection to the Toronto and Eastern line on the east.

The remainder of the Toronto and Eastern would be abandoned or turned over in part to the Oshawa Railway. The Port Credit line might be extended to Oakville and thus linked up with the Hamilton system, to provide a through link.

A minority report was filed by one member, Fred Bancroft, the representative of labor on the Commission. Bancroft approved the project in principle, and stressed the difference between the proposed lines and the typical United States interurban, often poorly built and over-capitalized. He dismissed truck competition with the statement "If the freight traffic on the highways has to pay its fair share for the upkeep of the highways, the electric railways will not be affected by competition of motor trucking."

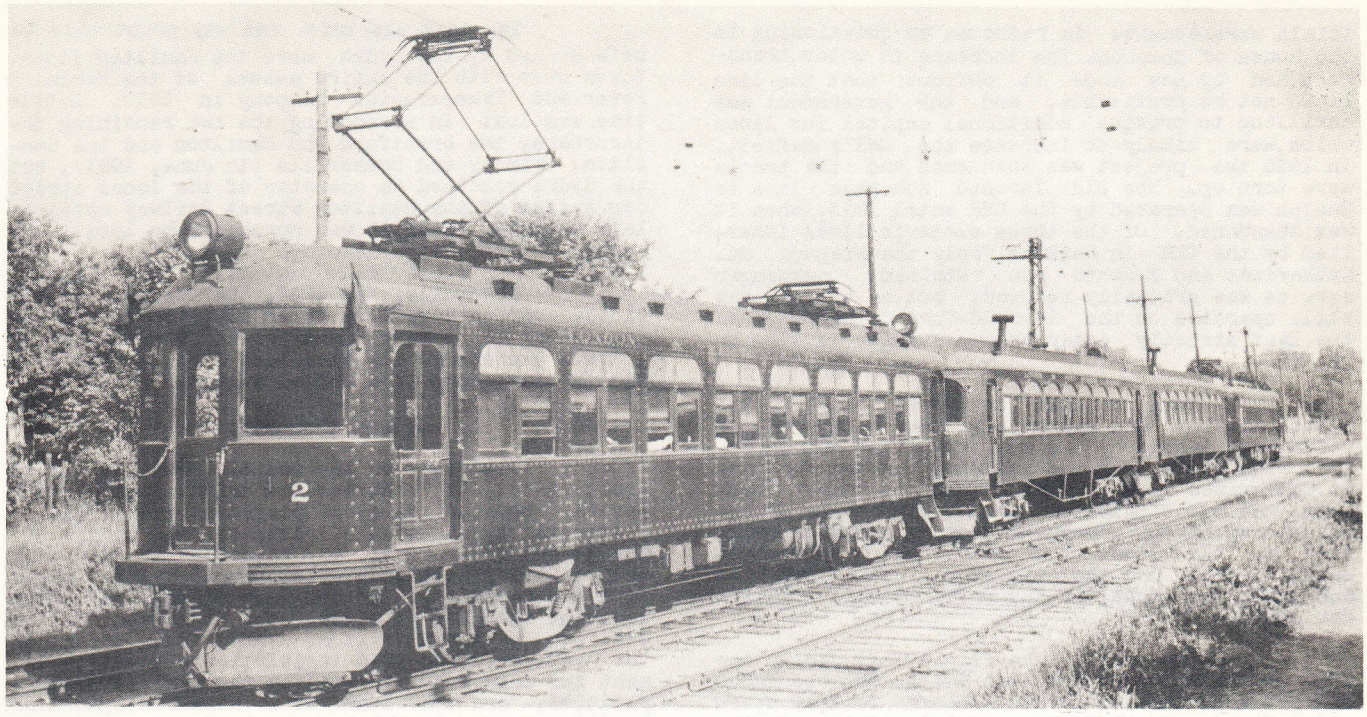
The report was, of course, highly unpopular with Sir Adam Beck, and in typical Beck fashion he issued a pamphlet, entitled Statement re Sutherland Commission Majority Report, in which he defended his proposals, and stressed the urgent need for the radials, which he argued would provide the only solution to the transportation problem in the area. He dismissed trucks as economically impractical, stating that typically they were not covering their expenses even when they did not have to pay for highway costs. He stressed several major points:

1. The Sutherland Commission members had no knowledge of the subject, and chose the wrong experts from the United States, particularly steam railroad men who were prejudiced against the use of electricity, and electric railway men not familiar with the radial type of line; by contrast, Arnold was a recognized expert in the field.

2. The charge of duplication with the Canadian National was regarded as absurd, because of the difference in the type of service.

3. The superiority of the proposed radial lines, with high speed entrances into Toronto, private right of way, and stress on both freight and passenger service was emphasized. The high

BU #50



The London and Port Stanley Railway was electrified in accordance with the technical recommendations of Sir Adam Beck and the Hydro Commission. This railway therefore probably conveys a good impression of the nature of the Hydro Radials had they reached fruition.

construction cost was defended on the grounds of the need for high quality service and the inadequate standards of existing lines. The cheap power and the avoidance of overcapitalization relative to the United States situation were also noted.

The Death of the Plan

The Sutherland report struck the radial plan a major blow, by strengthening the opposition of the provincial government and raising doubts on the part of some municipalities. But Beck was unwilling to give up the fight, and his continued agitation was to result in serious recriminations and bitterness.

A week after the report was released, Premier Drury announced that the province would not guarantee radial bonds, but municipalities would be permitted to go ahead with radial plans if they wished, without provincial support. Early in 1922 the Toronto and Eastern proposal was resubmitted to the municipalities and approved by all - despite the Sutherland report - but with a close vote in Toronto. In March of 1922, the legislature, on Government initiative, repealed the 1914 Act, and replaced it by the Municipal Railway Act of 1922. The new Act provided that municipalities could build radial lines provided that they issued bonds themselves for the purpose (without provincial guarantee). They could operate the roads directly, or contract with Hydro to do so. The system of Hydro issuance of bonds secured by municipal indentures was discontinued, and the potential overall role of Hydro greatly reduced. Because of prior commitments, however, the Toronto-St. Catharines line and the Sandwich, Windsor & Amherstburg were exempted from the change, being still subject to provisions of the 1914 Act, but resubmission of this proposal to the municipal councils, and to the voters upon application of 15% of the rate payers was required. Most of the councils reapproved, but four, including the city of Hamilton, rejected the proposal. The final blow was dealt on January 1, 1923, when the voters of Toronto rejected the proposal (after the council had approved it) resubmitted to them on the basis of a court order. This was one of the most bitterly fought of all municipal elections in Toronto. The opponents centred their attack on the "waterfront grab" argument, that the city was losing to Hydro the control of the waterfront route of access. The newly-formed (1921) Toronto Transportation Commission was itself not too enthusiastic about the radial plans because of the loss to the city of good entrances for rapid transit lines, and the fact that Hydro plans ignored city lines.

The basic plan for a Toronto-St. Catharines line was now dead, in view of these rejections. The cities between Oakville and Toronto, however, sought the building of the line between Toronto and Oakville, or at least a connection from Port Credit to Oakville, though they preferred a high speed line to Toronto. The Drury government approved these plans, and construction by Hydro was authorized. In the Fall of 1923, however, the Drury government fell; the new government was completely unsympathetic, and the whole plan collapsed.

Meanwhile, in 1922, the cities involved in the Toronto and Eastern abandoned their plans for a radial and instead pressured the Canadian National to complete the Toronto and Eastern. In 1923, to the surprise of many people, the Canadian National agreed to do so, and to link the T & E with the Toronto Suburban by a line using the right of way of the old Belt Line around the north side of Toronto. Work was resumed on the T & E late in 1923, the original portion was placed in operating condition, and rails laid between Whitby and Pickering. By April of 1924 there were rumors that the project was being abandoned again; these were denied by the CNR. Construction into Toronto was held up pending decision on a route. In 1925 construction was stalled completely, and CNR off-

icials were evasive in response to questioning in the House of Commons. The increase in motor transport had by now made it obvious that the line could not be profitable, and the government was unwilling to provide additional capital for lines which were likely to increase the CNR's deficit. In 1926 the project was abandoned and the tracks were torn up. The old Toronto Suburban line to Guelph was operated by the CNR until 1931, when it was abandoned. Of the three electric lines inherited by the CNR in Ontario, only the Niagara, St. Catharines and Toronto was retained; passenger service was gradually reduced, but as of 1958 was still operated on the Thorold-Port Colborne line, the last strictly interurban passenger service in Ontario.

A long wrangle developed between the municipalities and Hydro over the return of the debentures issued by the municipalities and deposited with Hydro for the building of the Toronto-St.Catharines line. Hydro refused to return these until the municipalities paid their share of the amounts spent for surveys and other purposes relative to the line. The provincial government backed Hydro, and the city of St. Catharines sued and lost; an appeal to the Privy Council likewise was lost.

While none of the lines included in the 1920 radial network were ever built, Ontario Hydro did get into the interurban electric railway operating field. In 1920 the municipalities in the Windsor area had bought the urban and interurban lines owned by Detroit United and had contracted with Hydro for operation of them, under the terms of the 1914 legislation. In 1930 the cities formed the Sandwich, Windsor and Amherstburg Railway, which took ownership of the lines, but operation by Hydro continued until 1934, when by mutual consent the contract was terminated and the municipally owned company took over operation.

Similarly, in 1921, when the city of Toronto acquired the properties of the Toronto and York Radial as a part of the "clean up" deal of Mackenzie properties in the area, it contracted with Hydro for operation of the lines, with the city meeting the deficits. In 1927, in an effort to reduce losses, the city took back the operation of the lines. Ultimately the Lake Simcoe and Scarborough lines were abandoned, and the Port Credit line cut back to Long Branch, to which a city car line still operates.

In 1929, Hydro took over the operation of the Windsor, Essex and Lake Shore, which had been purchased by the municipalities in the area from the private owners to forestall abandonment. The road was modernized and new equipment purchased, but to no avail; in 1932 it too was abandoned.

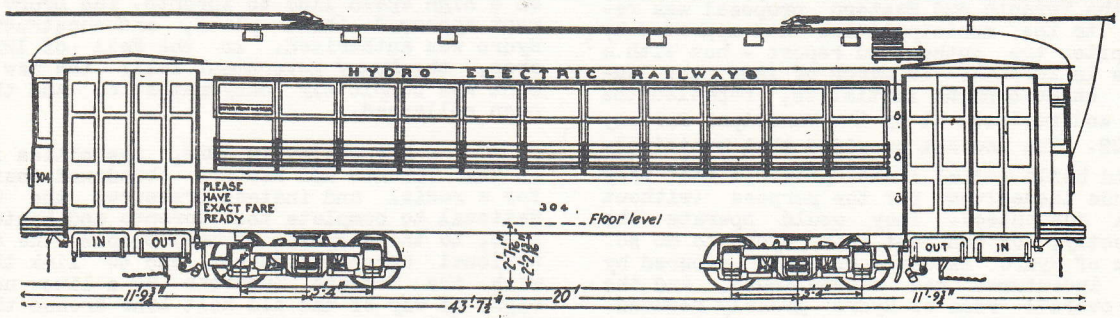
The last electric railway properties to be acquired by the Hydro were the Hamilton lines, taken over with the entire assets of the Dominion Power and Transmission Company in 1930. Little time was lost in abandoning the two remaining interurbans, the Brantford and Hamilton and the Hamilton, Grimsby and Beamsville (in June, 1931), but the Hydro remained as operator of the local street car system of the Hamilton Street Railway until as late as 1946, when it was purchased by local interests.

Meanwhile, in 1925, harrassed from all sides, and particularly by an investigation arising out of the embezzlement of Hydro funds by his private secretary, Sir Adam Beck died - and with him the last hope of a radial system.

A Brief Evaluation

The story of the radial plans is one of frustrations, of "almosts" and "might have beens". Several obvious factors played a major role in preventing construction - World War 1; the fall of the Hearst government; the tendency of Sir Adam Beck to antagonize provincial premiers; the spread of Hydro activities in too many directions, with constant changing of plans; the formation of the Canadian National system; and a basic defect in the Beck-conceived 1914 legislation - the requirement for universal approval by the various municipalities, and the lack of a workable system of handling cases in which a few held out. Had this problem been avoided by formation of radial districts, some lines might well have been built; or, in spite of this problem, some might have been built had not the war intervened, or the Drury government elected. Or, had Hydro undertaken the building of the lines itself in 1913, as it might well have done, progress would have been much more rapid - but in this instance Beck displayed untypical caution. These various obstacles held up construction until the development of the automobile had essentially rendered the plans, as a whole, obsolete.

As of 1912, given the transportation picture in the province and the state of development of the automobile, there was clearly justification for some of the lines - particularly the St. Catharines and London routes. The Port Perry route would almost certainly have been a failure even had conditions remained unchanged. By 1920 the automobile had developed to the point at which it should have been obvious that even the best of the long-distance lines proposed could not have been profitable. The Sutherland Commission report, of course, proved to be correct; had the lines been built, for the most part they would almost certainly have been abandoned, at least for passenger service, long before their costs had been recovered. As freight carriers they would merely



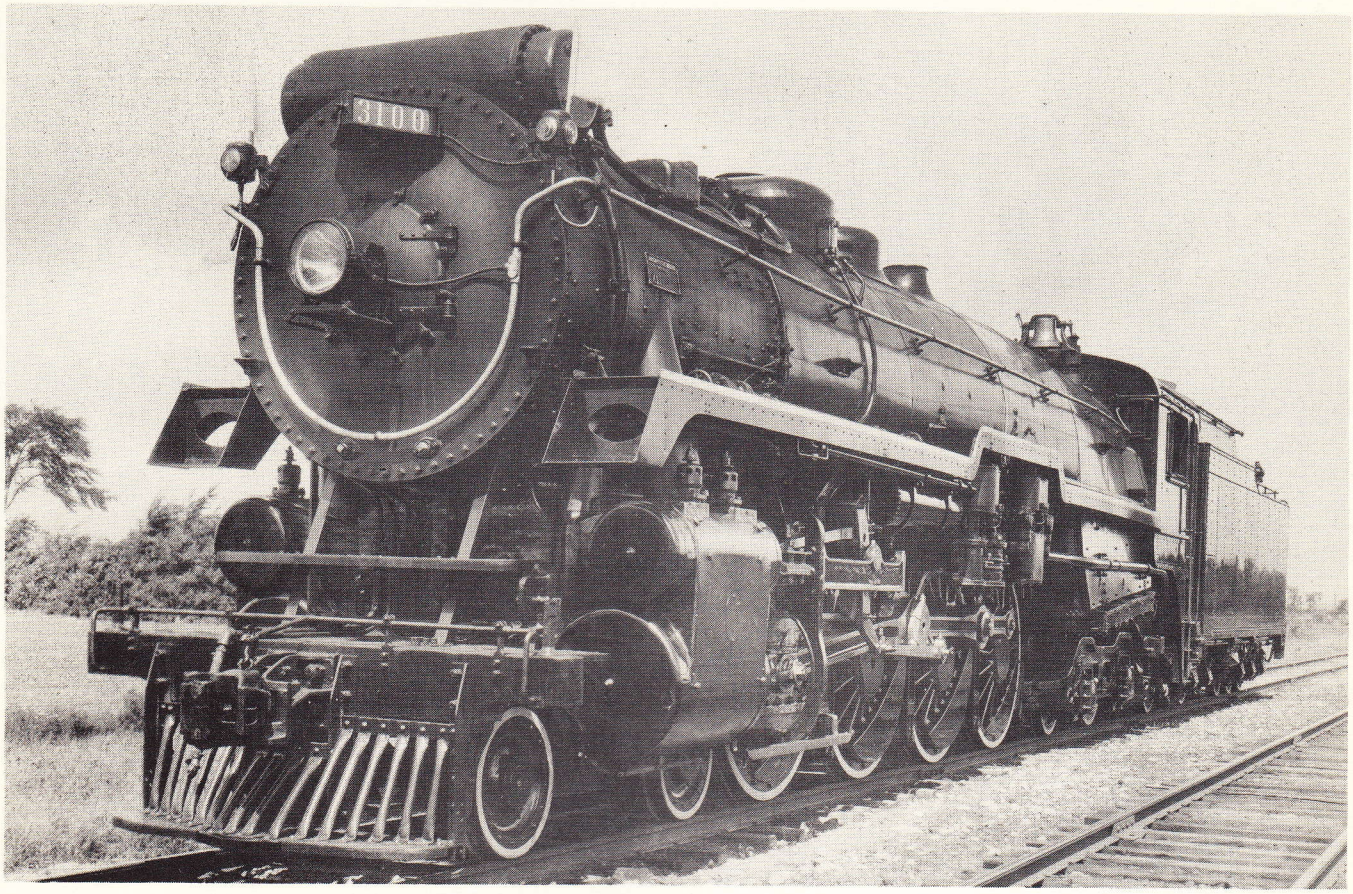
Although no part of Beck's Radial project ever materialized, the Hydro-Electric Power Commission of Ontario was nevertheless at one time a major electric railway operator in southern Ontario. It operated at various periods, on behalf of the owners, the Guelph Radial Railway, the Toronto and York Radial Railway and the properties at Windsor, and owned the railway system at Hamilton from 1930 to 1946. In a modernization program several car groups were purchased, including cars 301-304 for the Sandwich, Windsor and Amherstburg Rly.

have diluted the business of the CNR and the CPR. The question may be asked why Sir Adam Beck continued to fight for the projects to the bitter end. One associate of his suggests that in part he was misled by his engineers, who were strong believers in the "auto is a fad" doctrine, and that in part it can be attributed to his tenacity in fighting for a cause when opposition developed.

Despite the fact that the system as a whole would have proven to be a failure had it been built, the portions of the lines which would have constituted rapid transit routes into downtown Toronto from suburban areas, terminating in a subway up Bay St. to Queen, would have made important contributions to the solution of metropolitan area transit problems. It is this type of service for which rail passenger vehicles are best suited. These were, of course, the lines which the Sutherland Report suggested as suitable for development by the city. It is doubtful if even these lines would have been profitable, at least after 1929, but they would almost certainly have proven to be justifiable if their contribution to the relief of traffic congestion is taken into consideration; they would have offered far better service to suburban areas than that which is available today. Unfortunately, the construction of such lines is still of the future.

Monument to Sir Adam Beck on the centre mall of University Avenue, Toronto, just south of Queen Street.

CANADIAN PACIFIC 3100-3101 4-8-4 Class K-1-a



3100 when new (1928)

Late in the summer of 1928, a significant new locomotive design emerged from the Angus Shops of the Canadian Pacific Railway. This was embodied in two heavy Northern type engines numbered 3100 and 3101. Used during the running-in period between Smiths Falls and Montreal, they were later put in heavy passenger service between Toronto and Montreal, supplementing the two smaller and older 4-8-2s, 2900 and 2901.

3100 and 3101 were the first locomotives of their type on the Canadian Pacific and, as events were to show, the last. They embodied many features new to Canadian railway practice, and remained on their designed service for more than 25 years.

The hope of the designers was to produce an engine which best combined high tractive effort with low engine weight. These were the first locomotives in Canada to employ the one-piece cast-steel frame. The single frame casting for each locomotive weighed 23 tons, which represented a saving of about two tons over a fabricated frame of the same capacity. The cylinder and valve chest casings were also in the form of a single casting, the first such instance in Canada; this resulted in additional strength with a 25% weight reduction. The tender frame was also a single casting.

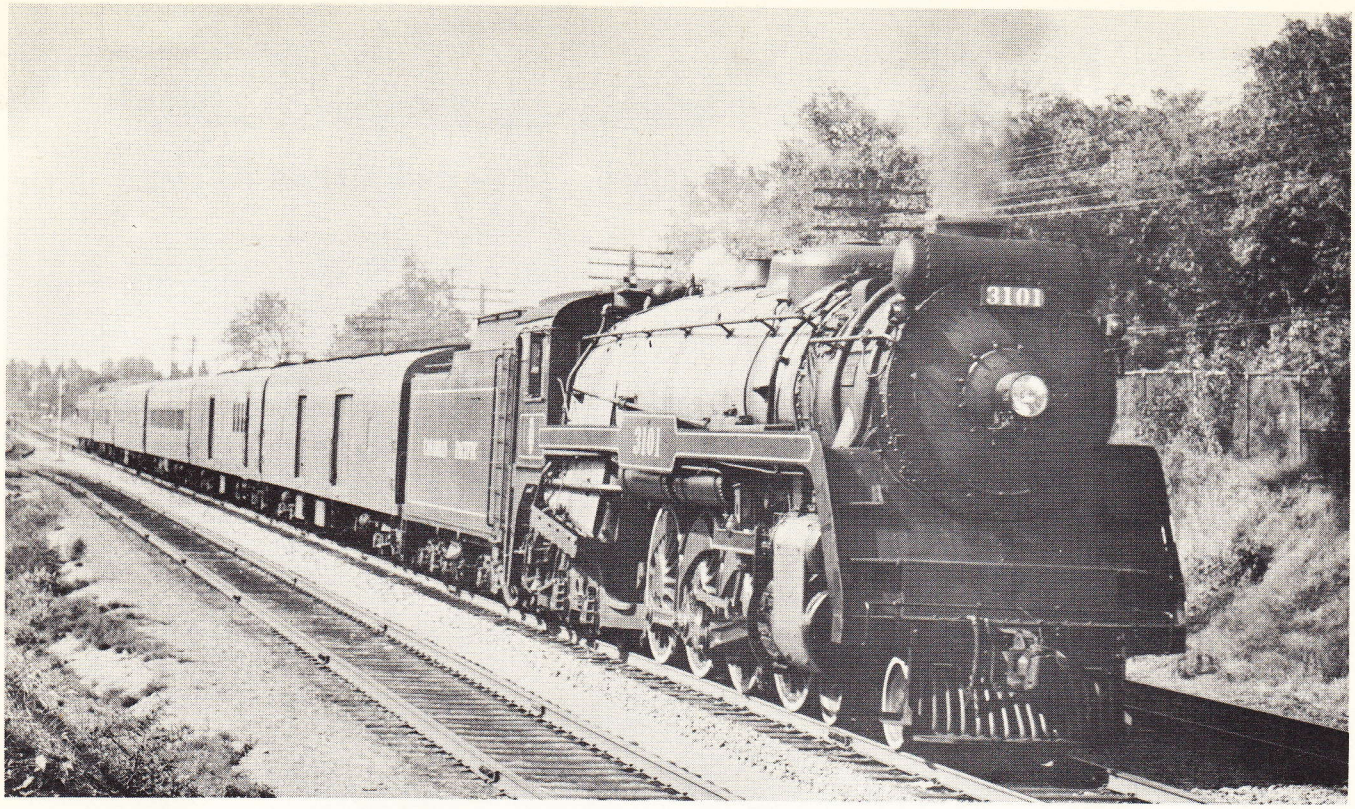
Additional weight saving was effected in the construction of the boiler. Nickel steel was used to a greater extent than in previous designs, resulting in another substantial weight reduction. Nickel alloys were used in all reciprocating parts and in many minor cast components.

Despite the comparatively low engine weight, the high tractive effort of 60,800 lb. resulted from the employment of steam at 275 lb. pressure, considerably higher than any other Canadian locomotive at the time. This tractive effort was slightly higher than that of the Canadian National's 6100-class 4-8-4s introduced the previous year, though the starting effort of the latter, which were fitted with boosters, was slightly higher than that of the Canadian Pacific engines.

3100 and 3101 were employed almost exclusively between Montreal and Toronto until displaced by the omnipresent diesel in March 1954. Before they were many years old, their appearance was modified by the installation of "elephant ears" smoke deflectors, and the engine number was moved to the centre of the running board which was widened to receive it; this was a distinctive feature of many of the Canadian Pacific's larger engines. A photograph of 3100 in this condition appeared in Bulletin 52. The smoke deflectors were later removed.

Upon the introduction of diesels on the passenger service between Toronto and Montreal, 3100 and 3101 were employed for a time east of Montreal, but before long were converted to burn oil fuel and transferred to the Western Region operating out of Winnipeg. At this time they lost their maroon, black and grey passenger colour scheme to appear in more conservative black, though retaining the gold striping on the running board and tender sides. After about three years in Western service, however, they were relegated to storage where they remain at time of writing, awaiting an uncertain future.

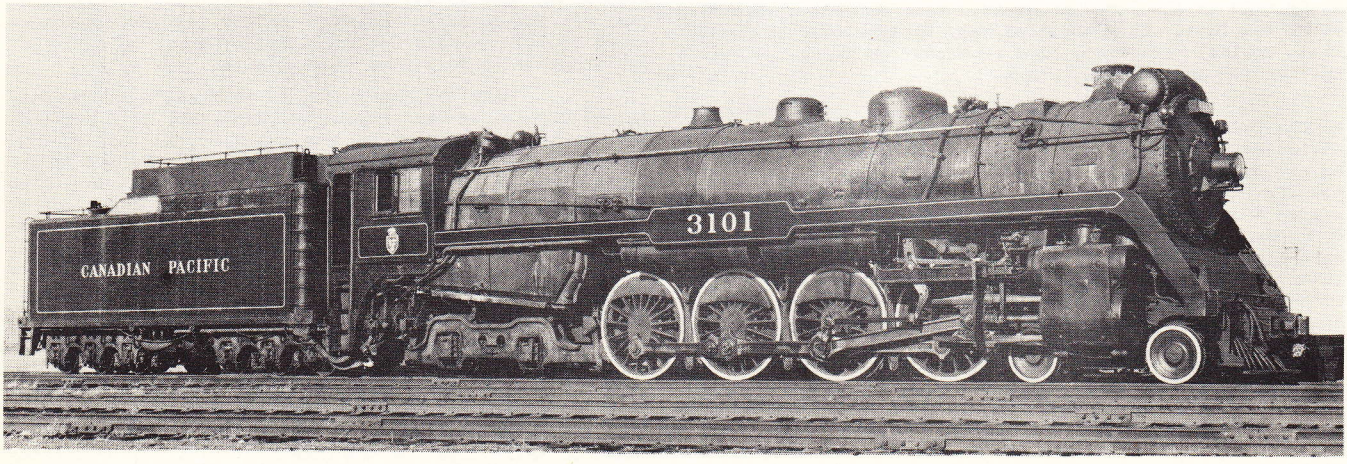
In the summer of 1947 it was believed in many railroad circles that 12 additional 4-8-4s, to be modernized versions of the 3100s, had been ordered for service between Toronto and the Lakehead. Unfortunately, this belief proved groundless, and they remained the only examples of their type on the Canadian Pacific, which may seem strange in view of the enthusiasm with which the Canadian National adopted the Northern type. Nevertheless, many of the innovations of the design of the 3100s were adopted in building the many Hudson (4-6-4) and Royal Hudson locomotives for which the Canadian Pacific is famous. The two Northerns were thus not without influence on Canadian steam locomotive development.



3101 at Montreal West, Sept. 20, 1954. (F.Sankoff Photo)

Numbers	3100-3101
Construction	Angus Shops, Can. Pac. Rly.
Class	K-1-a
Maximum Height	15'7"
Maximum Width	10'8"
Weight (engine plus tender)	709,000 lb.
Weight (engine only)	423,000 lb.
Weight (on drivers)	250,000 lb.
Rigid Wheelbase	19'9"
Engine wheelbase (total)	45'9½"
Overall wheelbase	87'0¼"
Length overall	97'5½"
Driver diameter	75"
Boiler, type	Conical
Boiler, diameter outside, first ring	84¼"
Working pressure	275 lb./sq.in.
Tubes	7, 3½" and 59, 2¼"
Flues	196, 3½"
Length of tubes	20'6"
Combustion chamber, length	5'0"
Heating surface, firebox and arch tubes	422 sq.ft.
Heating surface, tubes and flues	4509 sq.ft.
Superheating surface	2112 sq.ft.
Firebox	140 3/16" x 96"
Grate area	93.5 sq.ft.
Valves	7" travel, 14" diam.
Lap: 1 1/8"; lead	¼"
Cylinders	25½" x 30" stroke
Tractive effort	60,800 lb.
Factor of adhesion	4.12
Valve gear	Walschaert
Tender capacity	12,000 gal., 18½ tons

Plans for these locomotives will be found in the book "One Hundred Years of Steam Locomotives" and in the October 1928 issue of "Canadian Railway and Marine World", a predecessor of "Canadian Transportation".



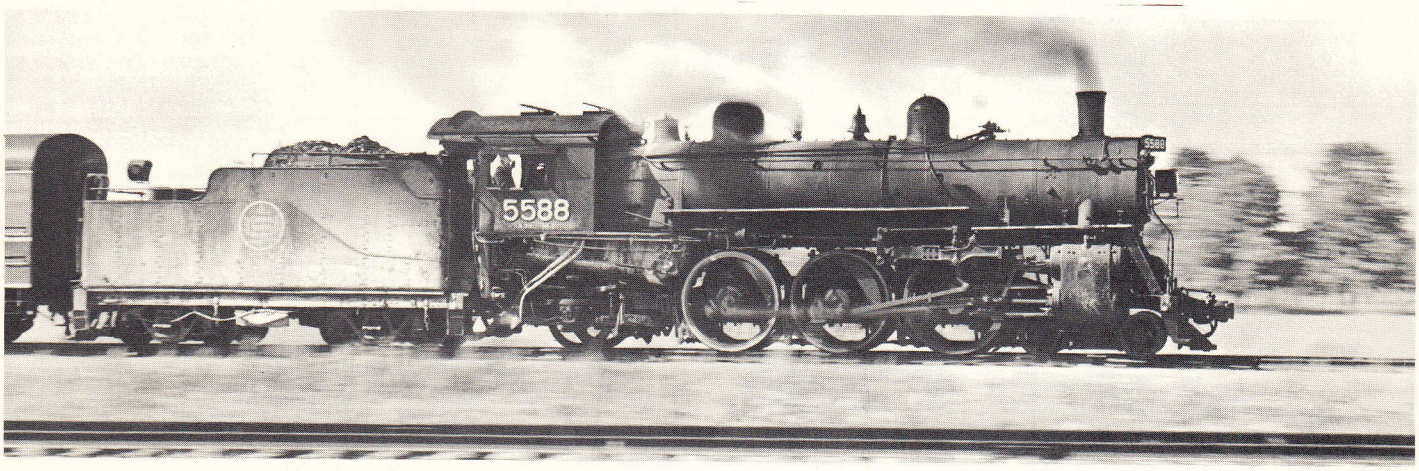
3101 in storage at Weston Shops, October 1957. (W.Krawiec Photo)

Upper Canada Railway Society – BOX 122, TERMINAL "A" TORONTO

5557-5611

K-3

(Except K-3-g)



ABOVE: With whistle screaming and Baker valve gear at maximum cutoff, K-3-b 5588 is captured in classic action near Palmerston, Ont., in 1958. Note how sediment from the boiler blowdown has coated the firebox and tender. /Tom Miller

During its last decade as an independent railway, the Grand Trunk entrusted its passenger services to a fleet of 105 Pacific Type locomotives constructed between 1910 and 1920 by a variety of builders, including the GTR itself. All of these locomotives were built to essentially the same specification, except that 55 of them were fitted with 73" drivers, while the remainder had driving wheels measuring just 69" in diameter.

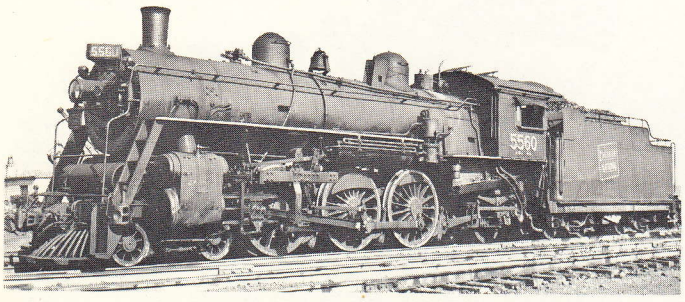
When the bankrupt Grand Trunk was absorbed into the newly-formed Canadian National Railways in 1923, the 55 locomotives of the former group were carried into CNR books as class K-3, road numbers 5557-5611. (It is of interest to note that CN's 15 additional locomotives in the K-3 class, K-3-g nos.5612-5626, were ex-Grand Trunk Pacific, and bear little resemblance to the GTR engines.)

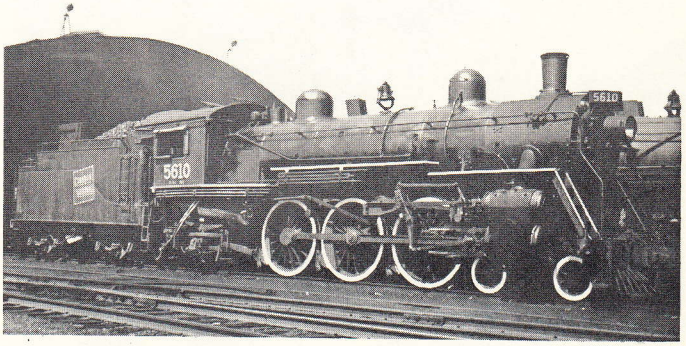
By latter-day standards, the K-3's were basic locomotives. As built, GTR nos. 200-222 and 289-299 were saturated engines, equipped with Stephenson motion. By the mid-1920's however, superheaters had been applied and the Stephenson gear replaced by more modern motion. In general, CNR 5557-5577 and 5600-5611 were equipped with Walschaerts valve gear, with Baker gear applied to the remainder; the comparatively rare Young gear found its way at one time or another to engines 5598/99 and 5608-5611, although some of these applications were temporary. GTR nos. 223 and 224 were constructed with experimental Hobart Allfree cylinders and valve gear which were removed several years later in favour of conventional cylinders and Baker gear. Refinements such as stokers were unknown to the K-3's, and power reverse gears were comparatively recent additions. Elesco feedwater heaters and pumps were applied in latter days to a number of the 5500's.

The K-3's never ventured far from home, and were a common sight in Ontario and Quebec on secondary passenger trains and wayfreights. However, two members of the class, nos. 5558 and 5593, operated for many years in Saskatchewan. The K-3's figured in their share of accidents, minor and major. In the latter category was a head-on collision at Komoka, Ont., in 1915, involving GTR engines 231 (later CNR 5567) and 1008; the 4-6-2 was rebuilt and back in service some nine months later. Not so fortunate was 5570, which was scrapped after it overturned at Brantford, Ont., on February 2nd, 1945, while doubleheading 4-8-2 6077 on a freight train.

Only one representative of this utilitarian class is now extant, that being engine 5588 which is displayed in a fine location on the waterfront at Windsor, Ontario.

BELOW: Numerous variations in piping and appliances characterized the K-3's. Walschaerts-equipped 5560 is typical of many of the 5500's in latter days. Engine 5610 sports a huge headlight and Young valve gear -- a gear in which valve motion is taken from the crosshead on the opposite side of the engine. /J.A. Brown Collection



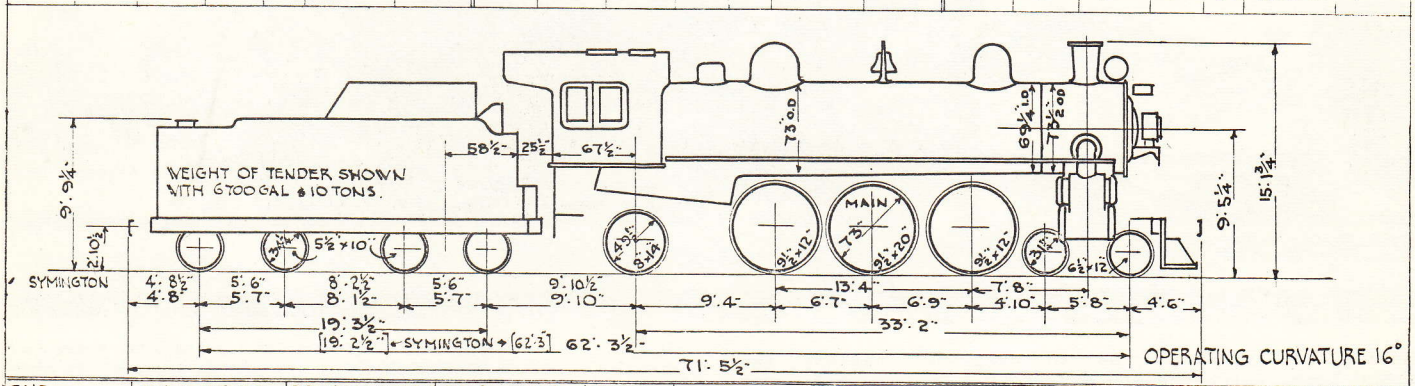


CANADIAN NATIONAL RAILWAYS

MECHANICAL DEPARTMENT
MONTREAL

TYPE **PACIFIC** CLASS **K.3**

No.	Sub Class	Date Built	Bldr	GTR No.	Date Scrapped	Notes
5557	K-3-a	1911	GTR	201	7/ 1/58	3
58		"	"	204	4/21/60	3
59		1910	GTR	207	9/30/61	
60		"	"	222	3/21/60	1
61		1912	GTR	225	6/ 7/61	
62		"	"	226	9/30/61	
63		"	"	227	5/ 9/58	
64		"	"	228	3/21/58	
65		"	"	229	2/29/60	
66		"	"	230	3/28/58	
67		"	"	231	5/23/58	
68		"	"	232	2/29/60	
69		1913	MLW	233	8/31/61	
70		"	"	234	12/31/46	
71		"	"	235	12/17/54	
72		"	"	236	1/ 9/59	
73		"	"	237	8/23/57	
74		"	"	238	11/14/57	
75		"	"	239	4/21/60	
76		"	"	240	8/ 7/62	
5577		"	"	241	12/20/41	
5578	K-3-b	1911	GTR	200	3/31/61	3
79		"	"	202	3/31/60	3
80		"	"	203	2/29/60	3
81		"	"	205	4/17/56	3
82		1910	GTR	206	11/ 8/57	
83		"	"	208	11/14/61	
84		"	"	209	3/ 7/60	
85		1911	GTR	210	8/31/56	
86		"	"	211	4/25/58	
87		"	"	212	9/27/57	
88		"	"	213	12/ 6/62	6
89		"	"	214	3/13/59	
90		"	"	215	7/31/51	
91		"	"	216	11/11/55	
92		"	"	217	10/31/57	
93		"	"	218	5/16/58	
94		"	"	221	2/21/60	
95		1912	GTR	223	9/27/57	
96		"	"	224	4/25/58	
97		1913	MLW	242	1/ 9/59	
5598	K-3-c	1911	GTR	219	12/31/46	
5599	K-3-c	1911	GTR	220	4/29/54	
5600	K-3-d	1910	GTR	290	2/21/60	1,4
01		"	"	291	11/3 /60	1,4
02		"	"	292	8/24/55	1,4
03		"	"	293	6/10/44	1,4
04		1910	BLW	295	7/ 4/58	4,5
05		"	"	296	5/14/61	4,5
06		"	"	297	11/ 7/60	4,5
07		"	"	299	3/19/59	4,5
5608	K-3-e	1912	BLW	289	4/25/58	2,4,5
5609	K-3-f	1920	GTR	288	2/21/60	2,4
10	"	1910	GTR	294	11/ 4/55	1,4
5611	K-3-d	1910	BLW	298	3/21/60	4



SUB-CLASS	CYLINDERS DIA.	CYLINDERS STROKE	DRIVING WHEELS OS. DIA	DRIVING WHEELS DIA-CTR	FIRE BOX LENGTH	FIRE BOX WIDTH	GRATE AREA SQ.FT.	TUBES LARGE	TUBES DIA.	TUBES SMALL	TUBES DIA.	TENDER CAPY LENGTH	TENDER CAPY WATER	TENDER CAPY COAL	SUPERHEATER	HAULAGE RATING
K.3.abcdef	23"	28"	73"	66"	96⅜"	75¼"	50.62	24	5⅜"	139	2"	20'-7"	6,700 GAL	10 TONS	SCHMIDT	34%

SUB-CLASS	HEATING SURFACE SQ.FT. TUBES	FIREBOX	TOTAL	SUPER-HEATER	WEIGHTS IN WORKING ORDER LBS ENGINE TRUCK	DRIVING	TRAILING	TOTAL ENGINE	TENDER	ENGINE & TENDER	LIGHT WEIGHTS DRIVERS	TOTAL ENGINE	FACTOR OF ADHESION	MAXIMUM TRACTIVE EFFORT	BOILER PRESS.
K.3.abcdef	2,194	181	2375	578	43,250	149,550	36,200	229,000	150,000	379,000	126,800	203,000	4.41	33,630	195# D IN
SYPHONS	"	231	2425		WITH COAL HOPPER	(14 TONS)			158,000	387,000					

SUB-CLASS	TYPE OF REVERSE GR	TYPE OF VALVE GR	SYPHONS	MECHANICAL LUBRICATOR	FEED WATER HEATER	STEAM HEAT	No & SIZE AIR PUMP	BRICK ARCH	EXTREME WIDTH
K.3.acl	SEE SPEC. LIST	WALSCHAERT	SEE SPEC. LIST	SEE SPEC. LIST	SEE SPEC. LIST	YES	1-11" ※	YES	10'-1¾"
K.3.b	"	BAKER	"	"	"	"	" ※	"	"
K.3.cef	"	YOUNG	"	"	"	"	" ※	"	"

1. GTR 290-294, 222 were renumbered from GTR 1st 200-205 in 1911.
2. GTR 288 was built for Grand Trunk Western; GTR 289 was originally Central Vermont 233, later transferred to GTW as 289.
3. CNR 5578/57/79/80/58/81 were actually GTR 2nd 200-205.
4. GTR 288-299 were all assigned to Grand Trunk Western prior to amalgamation with CNR.
5. Subsequent to CN takeover, and prior to 1930, nos. 5604-5608 were leased to Central Vermont as nos. 234-238.
6. CNR 5588 donated to the City of Windsor, Ont., for display.

BLW -- Baldwin Locomotive Works; GTR -- Grand Trunk Railway; MLW -- Montreal Locomotive Works

Upper Canada Railway Society
BOX 122 TERMINAL "A" TORONTO
LOCOMOTIVE DATA SHEET

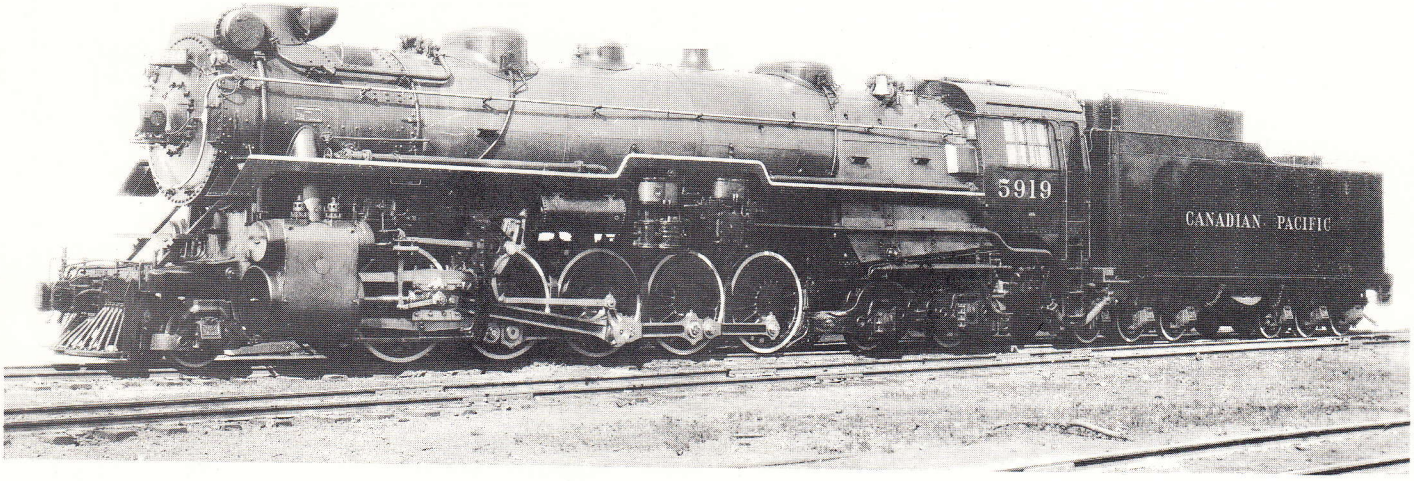
No. 6612

LEFT: Where diesels fear to tread, K-3-b 5583 wades through the floodwaters of Hurricane Hazel in the fall of 1954. Note the absence of an air reservoir on the pilot beam. /R. Buck Coll'n

BELOW: The appearance of 5585 is made more awesome by the addition of an Elesco feedwater heater and pump. The 4-6-2 has just brought "The Highlander" into Haliburton, Ont. The date: August, 1954. /J. Brown Coll'n

5900-5919

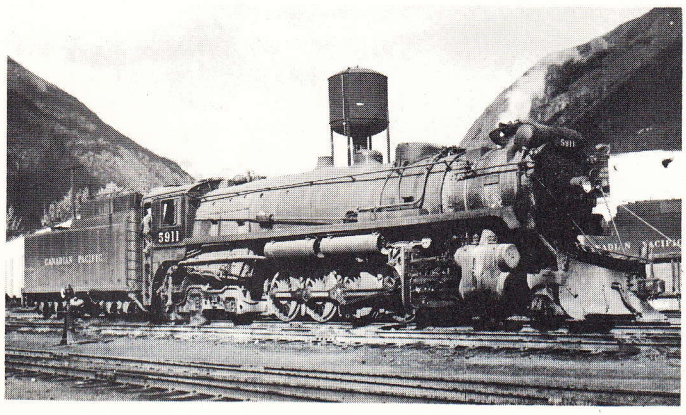
T-1-a



Canadian Pacific's most rugged mainline operation has always been the movement of tonnage over the mountainous stretch of trackage between Calgary, Alta., and Revelstoke, B.C. Characterized by heavy grades -- the worst being 22 miles of 2.2% compensated -- and tortuous curves as sharp as 12 degrees, this 262-mile section has traditionally placed severe demands on motive power in order to keep pace with the relatively easier traffic flows on adjacent subdivisions.

In the late 1920's, seeking to improve on the 2-10-0's and 2-10-2's that were then in charge of the mountain traffic, CPR designers set to work on a new 2-10-4 type locomotive which would produce a tractive effort without booster of 78,000 pounds -- 12,000 pounds more than the 2-10-2's. The 63" drivers of the new engines would enable them to handle passenger trains with considerably greater dispatch than was possible with the 58"-drivered 2-10-2's.

The first locomotives of class T-1-a, Nos. 5900 and 5901 were delivered in July, 1929 from Montreal Locomotive Works, and the 5900 was promptly placed on public exhibition in Montreal's Windsor Station. By the end of that year, all twenty of the T-1-a's were at work in the mountain service for which they had been constructed.



The T-1-a's were the largest locomotives in point of size and weight ever constructed in Canada; total weight of engine and tender in working order was just 375 tons. Their tractive effort was second only to Canadian National's 1924-built 4100-series 2-10-2's, which had a rating of 80,000 pounds.

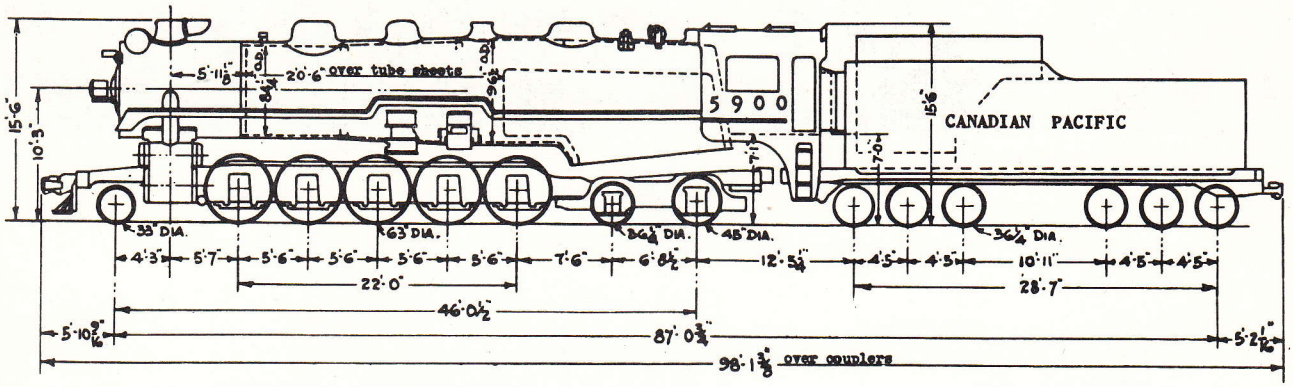
Many of the mechanical features of the 2-10-4's were not new to Canadian Pacific, having been introduced on the K-1-a 4-8-4's a year earlier. All twenty engines were equipped with nickel steel boilers and Commonwealth cast steel locomotive beds. B.C. forest fire regulations dictated oil firing. Elesco feedwater heaters and pumps were applied, while valve events were timed with Walschaerts valve gear. Remotely-controlled moveable exhaust deflectors were employed, to protect tunnel roofs from the explosive exhaust blast. The short, vestibuled cabs were given sloping sides as a concession to close clearances (although one locomotive, the 5911, emerged from a wreck repair with straight cab sides). All twenty locomotives were ultimately equipped with trailing truck boosters.

Few modifications altered the T-1-a's during their lifetimes. The rear sand domes were removed at an early date, undoubtedly as an aid to maintenance. Some locomotives were fitted with running board skirts and passenger striping and painting, and the familiar plow pilots were applied and removed with a frequency that defies recording. Several 5900's were fitted with headlights which could be swiveled from the cab, for improved visibility on sharp curves.

From their inception, the T-1-a's were masters of the Calgary-Revelstoke section. Equally at home on passenger or freight trains, it was not an uncommon sight to see two or three of them to a train, attacking the 2.2% east from Field. The T-1-a's were joined in later years by 16 semi-streamlined sisters. However, dieselization came early to the Rockies, relegating the 2-10-4's to side tracks in 1952. The T-1's were reassigned to freight service on the Prairies east of Calgary, a far cry from their mountain battling role. Finally, between March and November, 1956, the entire T-1-a fleet was scrapped; sadly, not one of these fine locomotives was preserved.

2-10-4 - SELKIRK TYPE

CLASS T 1
SUB CLASS T 1 A
CAPACITY 78%



AXLE SIZES 6"x11" 11½"x14" 11½"x14" 12½"x14" 11½"x14" 11½"x14" 7"x14" 8"x14" 6"x11" 6"x11"

SUB CLASS		T-1-a
BOILER PRESSURE	LBS./SQ.IN.	275
CYLINDERS		25-1/2"x 32"
DRIVING WHEELS		63"
TRACTIVE EFFORT	LBS.	77,200
TRACTIVE EFFORT OF BOOSTER	LBS.	12,000
FIREBOX WIDTH, INSIDE		96"
FIREBOX LENGTH, INSIDE		140-3/16"
GRATE AREA	SQ.FT.	93.5
ARCH TUBES, NUMBER & OUTSIDE DIAM.		4 3-1/2"
TUBES, NUMBER & OUTSIDE DIAM.		59 2-1/4"
		7 3-1/2"
FLUES, NUMBER & OUTSIDE DIAM.		196 3-1/2"
DISTANCE BETWEEN TUBE SHEETS		20' 4-7/8"

TUBE & FLUE HEATING SURFACE	SQ.FT.	4,509
FIREBOX HEATING SURFACE	SQ.FT.	377
ARCH TUBE HEATING SURFACE	SQ.FT.	45
FIRE HEATING SURFACE	SQ.FT.	4,931
SUPERHEATING SURFACE	SQ.FT.	2,112
COMBINED HEATING SURFACE	SQ.FT.	7,043
WEIGHT ON DRIVERS	LBS.	312,800
LOADED WEIGHT OF ENGINE	LBS.	452,500
LIGHT WEIGHT OF ENGINE	LBS.	412,500
LOADED WEIGHT OF TENDER	LBS.	297,500
LIGHT WEIGHT OF TENDER	LBS.	137,000
FUEL CAPACITY - OIL	IMP.GALS.	4,100
WATER CAPACITY	IMP.GALS.	12,000
BUILDER & DATE	MONTREAL LOCOMOTIVE WORKS, 1929	

Upper Canada Railway Society
BOX 122 TERMINAL "A" TORONTO
LOCOMOTIVE DATA SHEET

No. 6702

Compiled by: James A. Brown.

Contributors: R. Kain, D.M. More, O.S.A. Lavallee, W.H.N. Rossiter, R.S. George.

REVERSE SIDE, TOP: Builder's photo of 5919 shows the second sand dome with which the entire class was originally equipped. Note the moveable exhaust deflector. /Canadian Pacific

REVERSE SIDE, BOTTOM: T-1-a 5911 shows off its straight-sided cab at Field, B.C., in June, 1950. /R. Kain

LEFT: Eastbound perishables are hustled over the Laggan Subdivision by snowplow-pilot-equipped 5902. /W.H.N. Rossiter

BELOW: Eastbound varnish in charge of T-1-a 5914 and streamlined sister 5922 pauses briefly at Field, B.C., before assaulting the 2.2% climb to the Continental Divide. /R.S. George

5700-5704

K-5-a

10¢

Late in 1929, in light of increasing competition from rival Canadian Pacific in the Montreal-Toronto service, Canadian National Railways ordered three Hudson type locomotives, specifically designed for fast passenger running, from Montreal Locomotive Works. By mid-1930, the order had been increased to five, and in September of that year CN's first 4-6-4, No. 5700, was delivered.

No. 5700 looked swift, even at rest. Her lacy 80" spoked drivers were the largest ever cast in Canada up to that time. Piping on the boiler and firebox was concealed beneath a jacket of polished steel, and the whistle perched jauntily beside a short, squat stack. Air pumps and turbo-generator were concealed behind shields on the pilot, while the traditional sand dome was dispensed with in favour of a sand box concealed within the smokebox. Even the air reservoirs were hidden from view, as integral parts of the Commonwealth one-piece engine bed casting.

The first three K-5's were built with outside journal bearing engine trucks, while Nos. 5703 and 5704 were equipped with inside-frame roller bearing trucks. All five locomotives boasted trailing truck boosters, Elesco exhaust steam injectors and Baker valve gear.

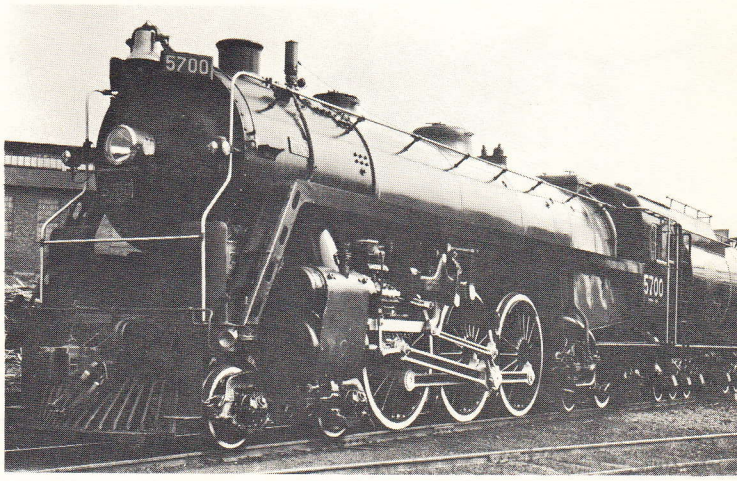
Tenders of the K-5's -- with 14,000 Imperial gallons water capacity, the largest ever on the CN system -- pioneered CN's truck-mounted unit brake cylinder arrangement, which provided for four separate cylinders, one to each side frame actuating the clasp brakes on one side of the truck only. The unit arrangement replaced the conventional tender frame mounting for the brake cylinder, which occasionally had a tendency to pull a truck off centre. The stoker engine and a track sprinkler were fitted to the K-5's tenders.

For better than ten years, first in competition with CP and then, under the pool agreement, in cooperation with the paralleling road, the 5700's were the mainstay of the fast Toronto-Montreal trains; by 1941, each engine had rolled up over a million miles, completing about 150 round trips annually. During the War, the trains they most frequently hauled, Nos. 6/15 and 14/5, became too heavy for their capabilities, and 4-8-4's gradually took over. From 1942 on, the 5700's were a common sight on fast southern Ontario passenger trains, although one would occasionally be called upon to take a section of one of the Montreal flyers. These engines saw comparatively little freight duty, and remained in passenger service continually until their withdrawal in 1959.

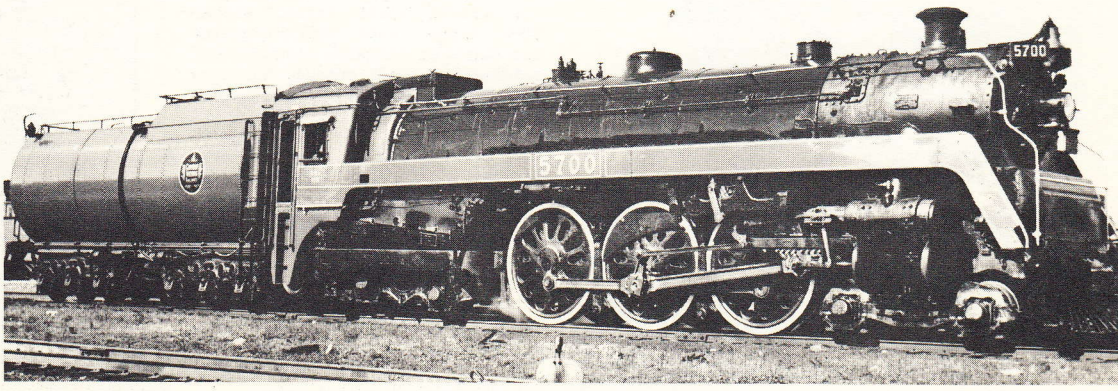
Although the 5700's were less than ideal for handling heavy trains, they performed admirably with their design load of eight or nine passenger cars, 70 m.p.h. speeds at half-throttle being commonplace. There were occasional unofficial clockings of K-5's running in the neighbourhood of 120 m.p.h. on the Montreal-Toronto route! The 5700's are said to have handled well, and gave an unusually smooth ride. This was not gained without expense, however, since backshop men recall that the K-5's were difficult to work on, particularly in matters concerning the trailing truck and booster.

Throughout their careers, CN's 4-6-4's underwent changes that both subtly and radically altered their appearance. In 1931, they were fitted with small wind scoops at the stack, which gave way to full-fledged smoke deflectors in 1943. At the same time as the deflectors were applied, the protective cowl at the pilot beam was closed in, the running board skirts deepened and the numbers, in cast bronze, relocated to the skirt. As well, the tender, cab and running board skirt of each locomotive was painted green. The smoke deflectors were removed in 1950 and cap stacks, in the style of the 6060-series 4-8-2's, were applied. In 1939, engine 5700 was fitted with Boxpok drivers, a modification which was confined to the one locomotive. An experimental application of a circular clear-vision windscreen (which rotated at high speed to give a clear forward view under the most adverse conditions) to the engineer's side of at least one of the K-5's was abandoned about 1950.

During the last decade of operation, engine 5704 lost its cap stack for a time in favour of a straight stack as was originally applied. Also during this period, Nos. 5702 and 5704 evidently exchanged their engine trucks, since the preserved 5702 bears an inside-frame truck while 5704 carried an outside-frame truck to the scrappers.



UPPER RIGHT: Gleaming in black Duco enamel and polished steel, 5700 looks every inch a thoroughbred as she poses for a builder's portrait in September, 1930.
/CNR



RIGHT: In a latter-day pose, fresh from Stratford Shops, 5700 typifies the appearance of the K-5's during their last decade of operation. Note the Boxpok drivers, unique to this engine.
/R. George Coll'n

SUB-CLASS	DATE BUILT	BUILDER	BUILDERS ORDER No.	BUILDER'S BOILER Nos		PRESENT ROAD Nos
K-5-a	1930	M.L.W	Q-370	68,394 to 68,396		5700 to 5704
				68,540 & 68,541		

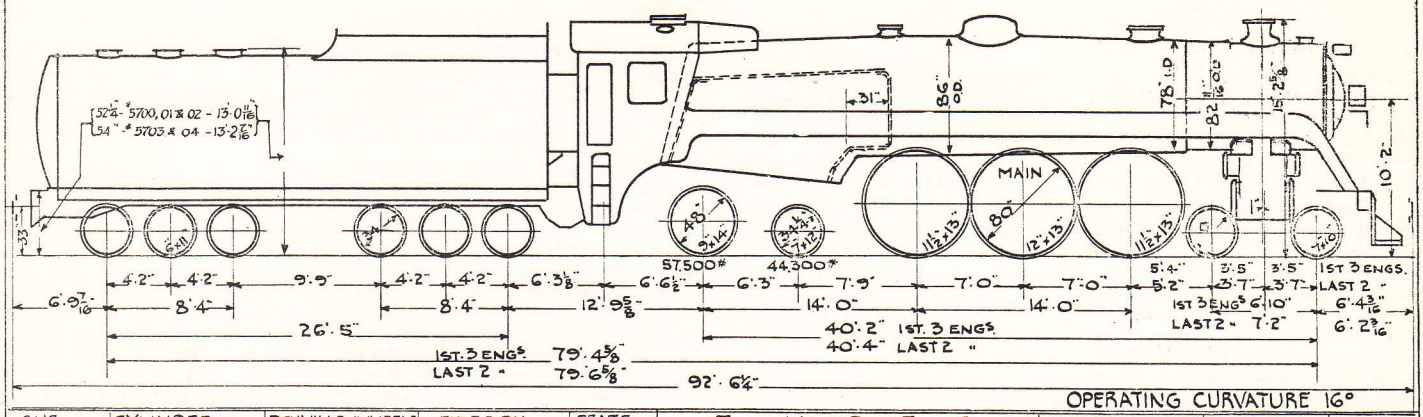
CANADIAN NATIONAL RYS
MECHANICAL DEPARTMENT
MONTREAL

TYPE HUDSON CLASS K-5

* WITHOUT BOOSTER
WITH BOOSTER = 53,300 LBS

COMMONWEALTH ENG. BED

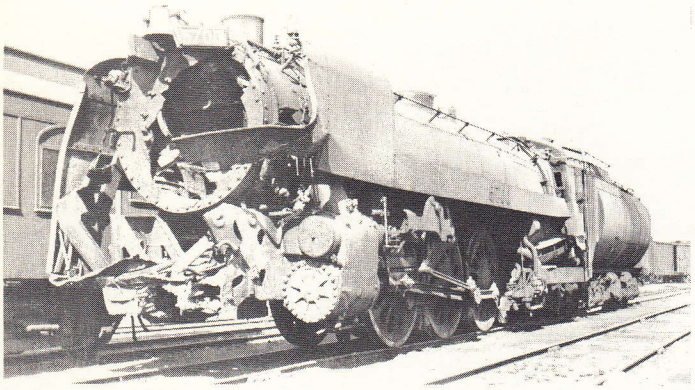
@ ENG. TR. WHEELS
# 5700, 5701, 5702 = 34½ STEEL TIRED.
# 5703, 5704 = 33" ROLLED STEEL.



SUB-CLASS	CYLINDER DIA.	CYLINDER STROKE	DRIVING WHEELS O.S. DIA.	DRIVING WHEELS DIA. CTR.	FIRE BOX LENGTH	FIRE BOX WIDTH	GRATE AREA SQ. FT.	TUBES LARGE	TUBES DIA.	TUBES SMALL	TUBES DIA.	TUBES LENGTH	TENDER CAPACITY WATER	TENDER CAPACITY COAL	SUPERHEATER	HAULAGE RATING.
K. 5. a	23"	28"	80"	73"	126⅛"	84 3/16"	73'-6"	146	3½"	44	2¼"	19'-1"	14,000 GLS	18 TONS	SCHMIDT "E"	43% B

SUB-CLASS	HEATING SURFACE □ FT TUBES	FIREBOX	TOTAL	SUPER-HEATER	WEIGHTS IN WORKING ORDER. LBS ENG. TR.	DRIVING	TRAILING	TOTAL ENG	TENDER	ENG & TEN	LIGHT WEIGHTS DRIVERS	TOTAL ENG	FACTOR OF ADHESION	MAXIMUM TRACTIVE EFFORT	BOILER PRESS
K. 5. a	3032	345	3377	1465	66,000	188,600	101,800	356,400	303,500	659,900	169,700	319,900	4.36	43,280 #	275 # □"

SUB-CLASS.		MECHANICAL LUBRICATOR	STOKER	TYPE OF REVERSE GR	TYPE OF VALVE GR	SYPHONS	MULT. THROT'L	EX. STM. INJ.	STEAM HEAT	No & SIZE OF AIR PUMPS	BRICK ARCH	EXTREME WIDTH.
K.5.a		SEE SPEC. LIST	SEE SPEC LIST	SEE SPEC. LIST	BAKER	SEE SPEC LIST	YES	SEE SPEC. LIST	YES	1-8½ cc	YES	10'-11⅝"

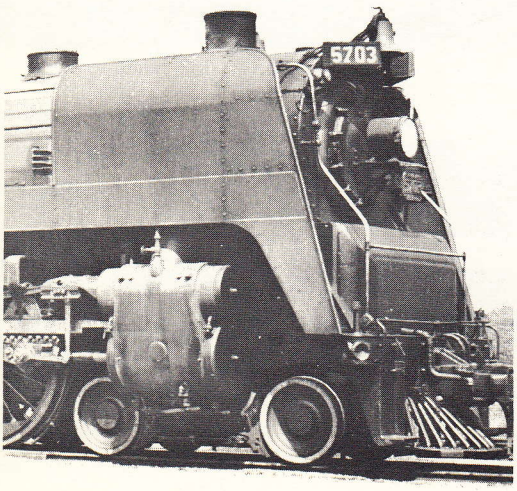


Two of the five K-5 class locomotives have escaped the torch, as follows:

5702 - Preserved by the Canadian Railway Museum, (CRHA) Delson, Quebec.
5703 - (Renumbered to 5700) Held in CN's historical collection. ●

Upper Canada Railway Society
BOX 122 TERMINAL "A" TORONTO
LOCOMOTIVE DATA SHEET

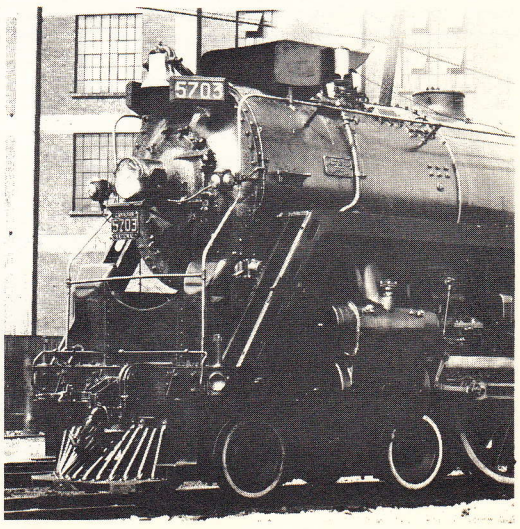
11-66



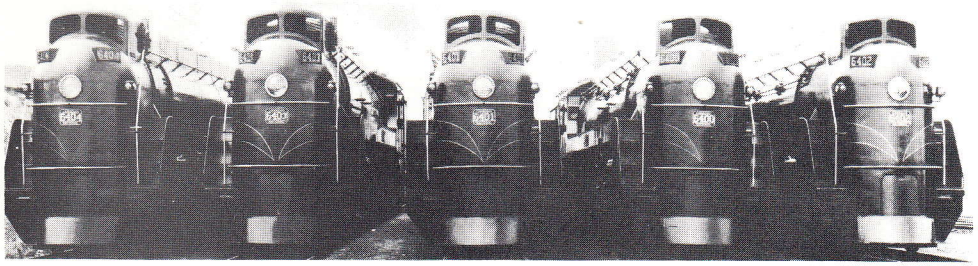
UPPER LEFT: The 5700's were not without their share of mishaps. This was the result when 5700 ran head-on into 2-8-0 No. 2392 at West Toronto, on September 10th, 1946. Just eleven months later, sister 5702 tipped over while rounding the curve at Kingston station, and skidded to a halt outside the operator's bay window, lying on her left side and filling the station with smoke. /F. Sankoff

RIGHT: The Hudsons' first experimental smoke lifter took the form of an air scoop, as shown here on 5703, in 1931. /CNR

LEFT: The full face-lifting of the early '40's produced the enclosed cowling and smoke deflectors shown here. (Compare 5703's engine truck with that of 5700, shown on the reverse side of this sheet.
/R. George Coll'n



6400-6410



An unfortunate feature of the steam locomotive was that the smoke frequently tended to blow down about the cab, obscuring the engineman's vision, particularly when the engine was drifting. It was this problem which led to the distinctive design of CN's streamlined U-4 4-8-4's.

In 1931, CN requested Canada's National Research Council to look into this problem, with the hope that radical changes in the locomotive's shape would yield considerable improvement in smoke flow and wind resistance. NRC's findings, developed from wind tunnel tests on a model of a 6100-class engine, showed that poor aerodynamic design of the domes, stack, etc., on the upper surfaces of the locomotive created eddies which slowed air velocity above the boiler to the extent that smoke was allowed to settle close to it.

A streamlined locomotive cowling was modelled in wood and underwent 27 modifications before NRC's engineers were satisfied; it was determined that when applied to an actual locomotive, a reduction of 35% in air resistance could be expected. The final design comprised a casing around the front end of the locomotive, approximately semi-cylindrical in form, molding into a spherical sector where it joined the top of the smokebox. A smooth casing, covering the stack, sandbox and domes, extended along the boiler top. Louvres in the front end of the casing admitted air about the stack; as this air was deflected upwards out of the casing, it lifted smoke clear of the locomotive. Curved front cab walls contributed to this layer of clean air along the top of the engine.

In June and July, 1936, Canadian National took delivery of five U-4-a 4-8-4's, streamlined along these lines. The first locomotive, No. 6400, was displayed in early June in Montreal's Bonaventure Station, and later in Toronto, at the foot of Simcoe Street.

In terms of boiler capacity and tractive effort, Nos. 6400-6404 lay between the 5700-series Hudsons and the 6100-series 4-8-4's; however, the 5700's had the edge in tractive effort when the booster was cut in. Built for speed, the 6400's had 77" drivers and were fitted with tender track sprinklers for laying the dust stirred up by fast running. The air compressor and turbogenerator were hidden behind the front cowl, and the front coupler hinged out of sight behind a sliding cover. The bell was mounted behind the louvres at the front of the casing, while the whistle hugged the outside of the casing on the left side. The 6400's were more colorful than had been CN custom to that time; the locomotive front and running gear were black; the running board, cab and tender were green to match CN passenger equipment. The boiler jacket and casing were of planished steel.

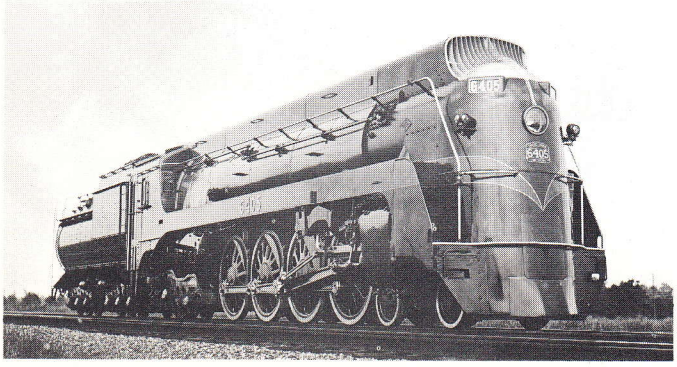
Following delivery, the 6400's were immediately placed in fast passenger service in the Montreal-Toronto-Sarnia cycles of the International Limited and similar trains, covering 10,000 to 14,000 miles per month.

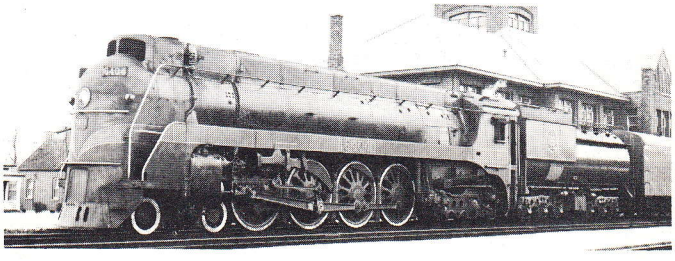
In July and August of 1938, Lima Locomotive Works built six U-4-b's for CN's subsidiary Grand Trunk Western. Nos. 6405-6410 were virtual duplicates of their Canadian sisters, differing primarily in the design of the louvres ahead of the stack.

With the delivery of more modern 4-8-4's in the early 1940's, the 6400's began to appear more frequently on local trains. Their streamlined cowlings proved to be a hinderance to maintenance, particularly where access to the smokebox was concerned; shop crews found that at least one day was required to deal with the nose casing each time the smokebox was opened.

The 6400's had their moments of distinction. In 1936, 6400 hauled a special train from Montreal marking the 100th Anniversary of the opening of the Champlain and St. Lawrence Railroad. In 1938, 6402 hauled President Roosevelt's special train to Kingston for the opening of the Thousand Islands International Bridge. A royal blue and silver 6400 handled the 1939 Royal Tour, followed by a successful visit to the New York World's Fair. Several 6400's had a hand in Princess Elizabeth's 1951 visit; 6403 operated to Winnipeg in this service and made several trips to Saskatoon before returning east, thus earning the distinction of being the only U-4 to operate in the west.

All of the 6400's were retired in 1960, and only 6400 itself remains, as part of CN's Historical Collection.

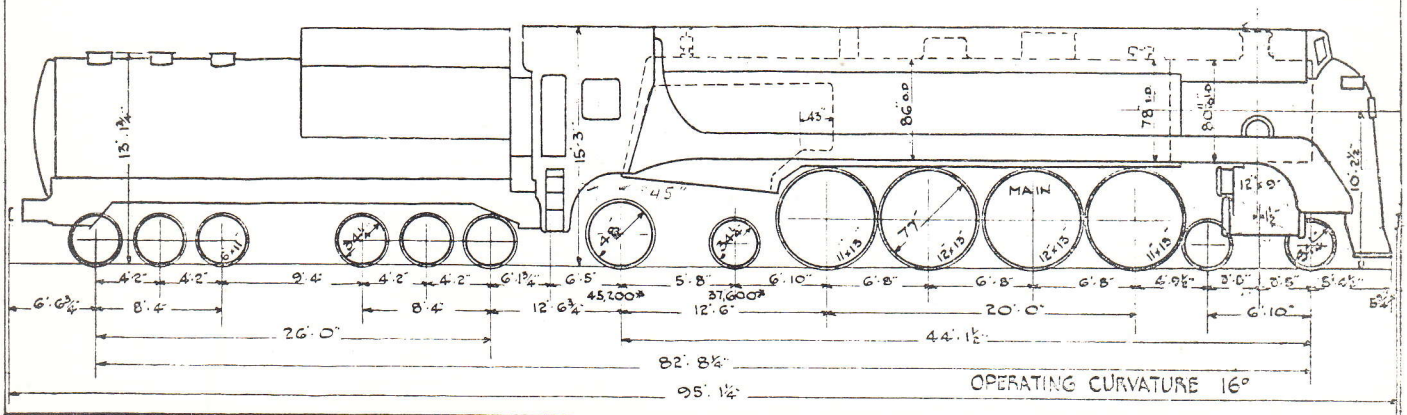




SUB CLASS	DATE BUILT	BUILDER	BUILDERS ORDER Nº	BUILDER'S BOILER Nº		PRESENT ROAD Nºs
U-4-a	1936	M.L.Co	Q-377	68715 to 68719		6400 to 6404

CANADIAN NATIONAL RAILWAYS
MECHANICAL DEPARTMENT
MONTREAL

TYPE **NORTHERN** CLASS **U-4**



SUB CLASS	CYLINDERS DIA.	CYLINDERS STROKE	DRIVING WHEELS O.S. DIA.	DRIVING WHEELS DIA. CTR.	FIRE BOX LENGTH	FIRE BOX WIDTH	GRATE AREA SQ. FT.	TUBES LARGE	TUBES DIA.	TUBES SMALL	TUBES DIA.	TUBES LENGTH	TENDER CAPACITY WATER	TENDER CAPACITY COAL	SUPERHEATER	HAULAGE RATING
U-4-a	24"	30"	77"	70"	126⅛"	84⅜"	73.6	146	3½"	44	2¼"	21'-10"	11,700 GAL	18 TONS	SCHMIDT "E"	52%

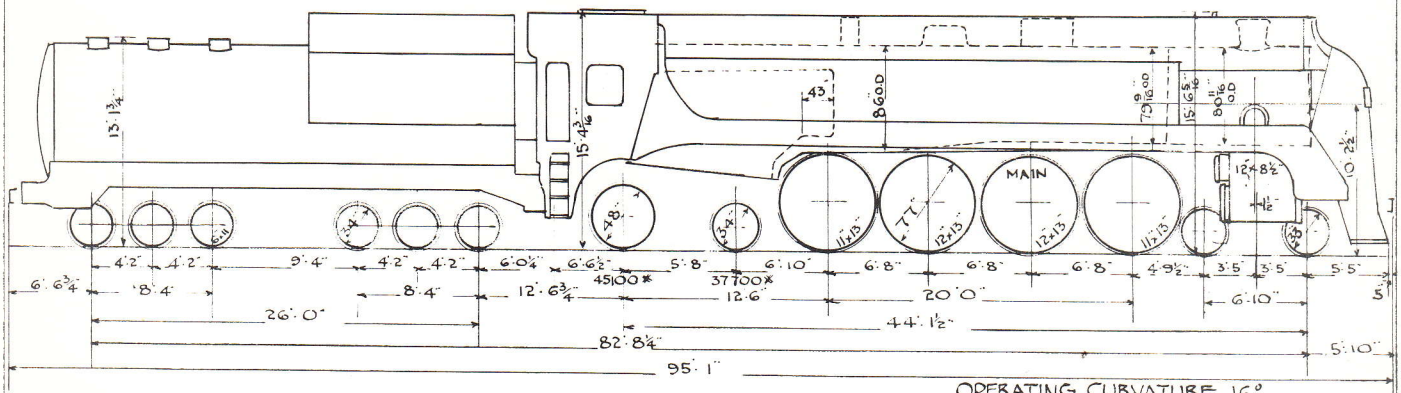
SUB-CLASS	HEATING SURFACE □FT TUBES	FIRE BOX	TOTAL	SUPER-HEATER	WEIGHTS IN WORKING ORDER LBS. ENGINE TRUCK	DRIVING	TRAILING	TOTAL ENGINE	TENDER	ENGINE & TENDER	LIGHT WEIGHTS DRIVERS	TOTAL ENGINE	FACTOR OF ADHESION	MAXIMUM TRACTIVE EFFORT	BOILER PRESS.
U-4-a	3,471	390	3,861	1530	61,000	236,000	82,800	379,800	280,280	660,080	212,400	371,800	4.49	52,457	275 lbs

SUB CLASS			STOKER	TYPE OF REVERSE GR.	TYPE OF VALVE GEAR	SYPHONS	MULT. THROT'L	EX. STM. INJ.	STEAM HEAT	Nº & SIZE OF AIR PUMPS	BRICK ARCH	EXTREME WIDTH
U-4-a			SEE SPEC. LIST		BAKER	SEE SPEC. LIST	YES	SEE SPEC. LIST.	YES	1-8½" CC	YES	10'-11⅜"

SUB CLASS	DATE BUILT	BUILDER	BUILDERS ORDER Nº	BUILDER'S BOILER Nºs		PRESENT ROAD Nºs
U-4-b	1938	LIMA	CO 1147	7759 to 7764		6405 to 6410

CANADIAN NATIONAL RAILWAYS
MECHANICAL DEPARTMENT
MONTREAL

TYPE **NORTHERN** CLASS **U-4**



SUB-CLASS	CYLINDERS DIA.	CYLINDERS STROKE	DRIVING WHEELS O.S. DIA.	DRIVING WHEELS DIA. CTR.	FIRE BOX LENGTH	FIRE BOX WIDTH	GRATE AREA SQ. FT.	TUBES LARGE	TUBES DIA.	TUBES SMALL	TUBES DIA.	TUBES LENGTH	TENDER CAPACITY WATER	TENDER CAPACITY COAL	SUPERHEATER	HAULAGE RATING
U-4-b	24"	30"	77"	70"	126⅛"	84⅜"	73.6	146	3½"	45"	2¼"	21'-10"	14300 US GAL	16 TONS	SCHMIDT-E	52%

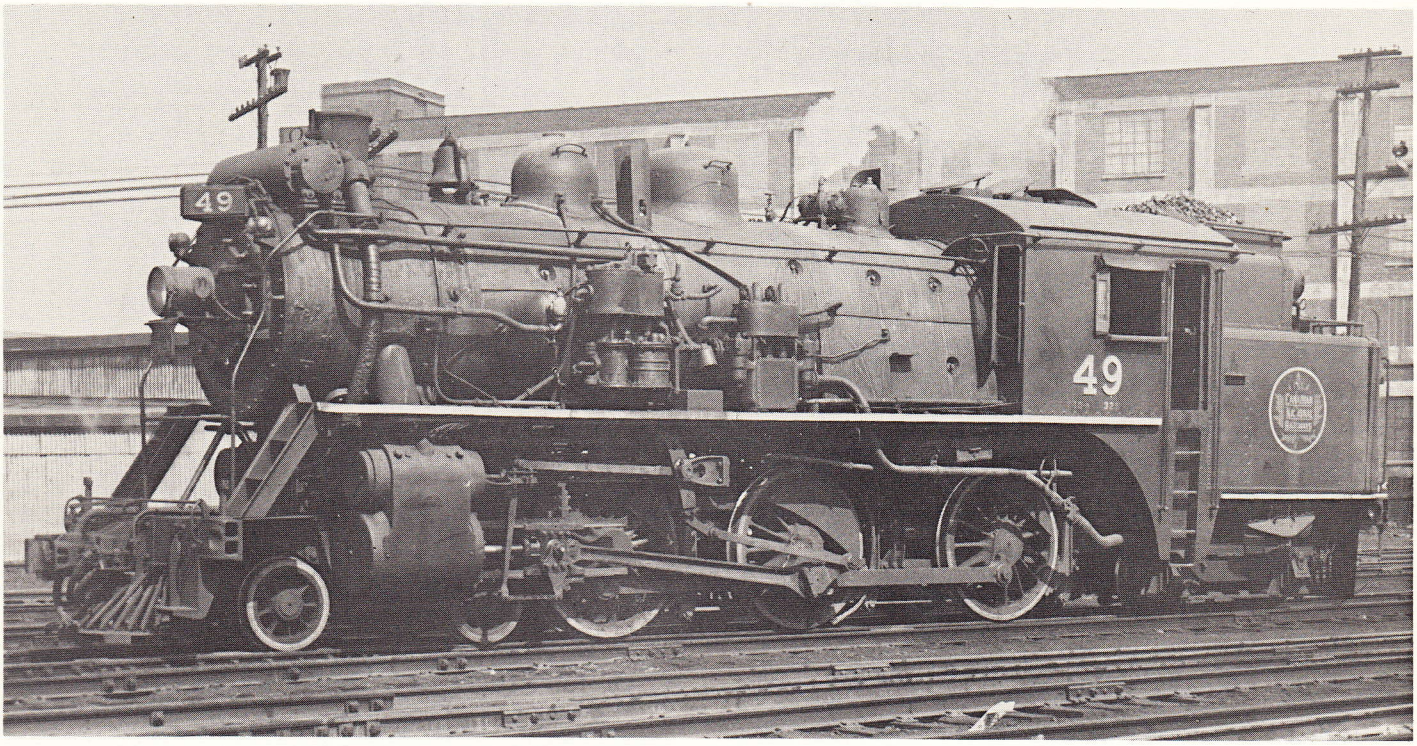
SUB-CLASS	HEATING SURFACE □FT TUBES	FIRE BOX	TOTAL	SUPER HEATER	WEIGHTS IN WORKING ORDER LBS ENGINE TRUCK	DRIVING	TRAILING	TOTAL ENGINE	TENDER	ENGINE & TENDER	LIGHT WEIGHTS DRIVERS	TOTAL ENGINE	FACTOR OF ADHESION	MAXIMUM TRACTIVE EFFORT	BOILER PRESS.
U-4-b	3458	394	3852	1530	62000	237,900	82,800	382,700	270,500	653,200	211,600	344,700	4.53	52,457	275 lbs

Upper Canada Railway Society
BOX 122 TERMINAL "A" TORONTO
LOCOMOTIVE DATA SHEET

No. 6704

Compiled by: James A. Brown.
Contributors: R.F. Corley, D.M. More, R.J. Sandusky.

45-50



ABOVE: No. 49 at Turcot, near the end of its career.
/John Freyseng Collection

For many years, Canadian National Railways and its predecessor Grand Trunk operated a suburban service for residents of the 'Lakeshore' communities toward the west end of Montreal Island. The original service extended to Vaudreuil, some 26 miles; however, in latter years declining patronage (some of which, no doubt, was lost to the adjacent commuter operations of Canadian Pacific) forced its cutback to Dorval, and in their last years the CN trains served that community and such intermediate stations as Lachine, Convent and Dominion on their way to Central Station.

Since there were no turning facilities for locomotives at either Dorval or Vaudreuil, the suburban service required locomotives which were capable of operation in either direction equally well. This requirement was admirably fulfilled by the Forney-type locomotive, which carried its fuel and water supply in a small bunker mounted on a fixed extension of the locomotive frame. For bi-directional operation, it was sufficient merely to provide a reversible seat for the engineman, and a pilot and headlight on the rear end. (It should be noted that while a 'tank' locomotive -- which carries its water supply in tanks alongside or over the boiler and its fuel supply in a rear-of-cab bunker -- may be properly classified as a Forney, the term Forney, as in the case of the GTR/CNR engines, does not necessarily imply a 'tank' locomotive.)

The early 1900's saw the Montreal suburban runs being handled by 4-4-2-type Forneys, augmented as required by conventional 2-6-0's and 4-6-0's. However, by 1914 increased traffic and the introduction of heavier steel suburban cars all but overwhelmed the little 4-4-2's, and a larger and more powerful locomotive was introduced.

Grand Trunk Nos. 1540 to 1545, 4-6-4-type Forneys, were outshopped by Montreal Locomotive Works in September, 1914 and immediately placed in the Montreal-Vaudreuil suburban service for which they had been designed. One was assigned for a short time to Montreal-St. Hyacinthe trains but was shortly withdrawn in favour of heavier power. The 1540's performed well with their seven-car consists, demonstrating the rapid acceleration characteristics so desirable in a stop-and-go commuter operation.

In their design, particular attention was paid to the design of the firebox and brick arch, to ensure the maximum possible combustion efficiency with an attendant reduction in smoke, so important in urban areas. Since it was not desired to have more than two systems of equalization, the front truck was equalized with the driving wheels.

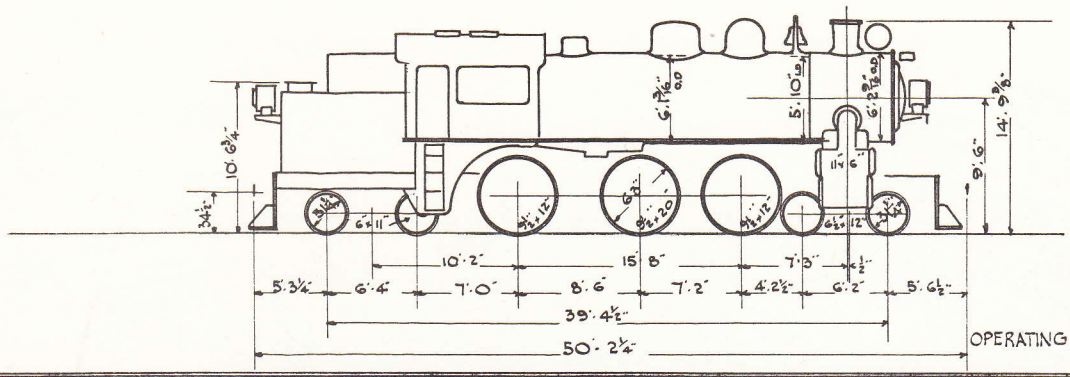
When they were absorbed into the Canadian National Railways roster in 1923, the GTR 1540's became CNR Nos. 45-50, class X-10-a. Under CN ownership, they remained in Montreal local service until the mid-1950's. In 1955, engine 48 was briefly assigned to Allandale, Ont., then to London, where it handled the local London-Sarnia service for over a year.

The diesel made its first inroads on the Forneys' empire in August, 1957 and by April, 1959 CN's Lakeshore commuter trains were fully dieselized; the trains themselves disappeared on June 30th of the following year.

Fifty per cent of the X-10-a class is preserved in museum projects: No. 46 by the Vaudreuil-Soulanges Historical Society of Dorion, Quebec; No. 47 by the Steamtown Museum of Bellows Falls, Vt.; and No. 49 by the Canadian Railway Museum at Delson, Quebec. Nos. 45, 48, and 50 were scrapped in August, 1956, January, 1959 and April, 1960 respectively.

SUB CLASS	DATE BUILT	BUILDER	BUILDERS ORDER No.	BUILDERS BOILER Nos.	PREVIOUS ROAD Nos AND INITIALS	PRESENT ROAD Nos
X.10.a	1914	M.L.W.	Q241	54894 to 54899	1540 to 1545 G.T.R.	45 to 50

CANADIAN NATIONAL RAILWAYS
MECHANICAL DEPARTMENT
MONTREAL
TYPE **SUBURBAN** CLASS **X.10**

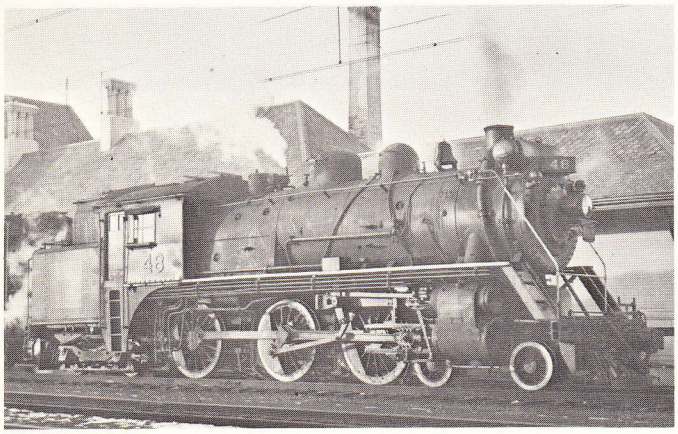


OPERATING CURVATURE 16°

SUB-CLASS	CYLINDERS DIA.	CYLINDERS STROKE	DRIVING WHEELS O.S. DIA.	DRIVING WHEELS DIA. CTR.	FIRE BOX LENGTH	FIRE BOX WIDTH	GRATE AREA SQ. FT.	TUBES LARGE	TUBES DIA	TUBES SMALL	TUBES DIA	TUBES LENGTH	TENDER CAPACITY WATER	TENDER CAPACITY COAL	SUPERHEATER	HAULAGE RATING
X.10.a	21"	28"	63"	56"	129⅛"	75¼"	47	26	5⅜"	191	2"	11'-10"	2900 GAL	5 TONS	SCHMIDT	32%

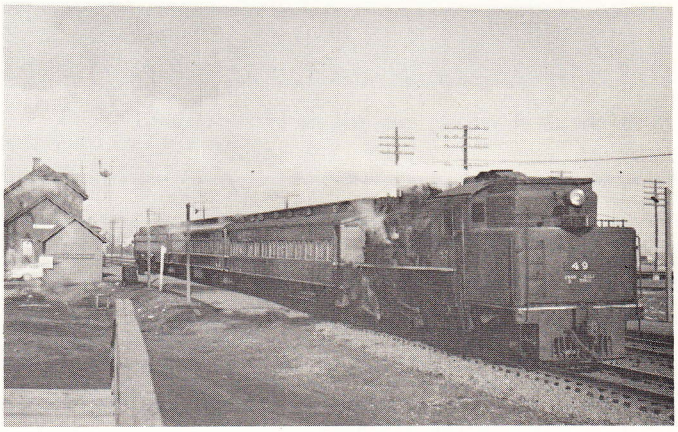
SUB-CLASS	HEATING SURFACE TUBES	HEATING SURFACE FIRE BOX	HEATING SURFACE TOTAL	HEATING SURFACE SUPER-HEATER	WEIGHTS IN WORKING ORDER ENGINE TRUCK	DRIVING	TRAILING	TOTAL ENGINE	TENDER	ENGINE & TENDER	LIGHT WEIGHTS DRIVERS	TOTAL ENGINE	FACTOR OF ADHESION	MAXIMUM TRACTIVE EFFORT	BOILER PRESS
X.10.a	1628	160	1788	342	49,000	146,000	80,000	275,000	–	–	131,400	222,800	4.49	32,487	210 lbs

SUB-CLASS	TYPE OF VALVE GEAR	FEED WATER HEATERS	STEAM HEAT	No. & SIZE OF AIR PUMPS	BRICK ARCH	EXTREME WIDTH
X.10.a	WALSCHAERT	SEE SPEC LIST	YES	1-8½ cc	YES	10'-1"



ABOVE: Far from its normal haunts, X-10 No. 48 smokes up the catenary at Sarnia, Ontario in December 1956, as it awaits the departure of train 620 for London.

/R.J. Sandusky

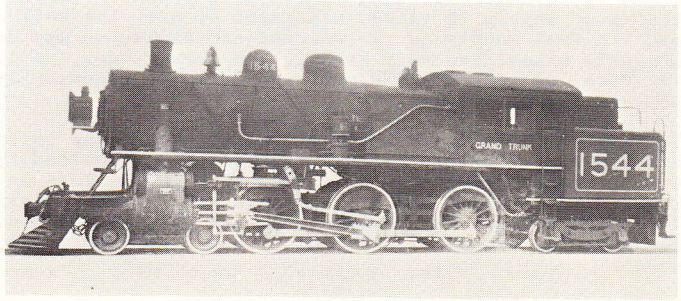


ABOVE: In traditional action, No. 49 eases away from CN's old Dorval station with an inbound local.

/R.J. Sandusky

BELOW: Despite the addition of feedwater heaters and two-stage air compressors by CN, the X-10's changed little over the years.

/MLW



Upper Canada Railway Society
BOX 122 TERMINAL "A" TORONTO
LOCOMOTIVE DATA SHEET

No. 6712

Compiled by: James A. Brown.

Contributors: R.F. Corley, J. Freyseng, R.J. Sandusky, D.M. More, G.W. Horner, O.S.A. Lavallée.