CPR SPIRAL TUNNELS CENTENNIAL

West of Hector (near Wapta Lake in Yoho National Park) the new Canadian Pacific Railway transcontinental main line was first planned to descend for 23 miles to the valley floor at Ottertail, 7 miles west of Field, B.C., on the "high line", a steady 2.2-per-cent grade along the mountainside, in accordance with the terms of CPR’s charter for building the line. This would have taken years to build across avalanche paths and through a 1400 foot rock tunnel in Mount Stephen, so in 1884 a temporary main line was built on a steep, 4.5-per-cent grade, aptly named the "Big Hill", from Wapta Lake to east of the present day site of Field (near the concrete slide shed). This allowed construction to continue and the railway to open for service without delay. (1)

For 25 years, the CPR operated trains on the Big Hill with helper locomotives and they were looking for a solution to the serious and costly problems of inefficiency in eastbound (uphill) train operations and safety in westbound (downhill) operations.

Above, three steam locomotives haul a six car passenger train plus a caboose up the steep grade of the 'Big Hill' in the upper reaches of the Kicking Horse canyon. The first of three safety switches and runaway tracks can be seen at the right of the photo. The wooden truss bridge below the last locomotive was later replaced with a steel truss structure which is still there today; it was used for the first road through this pass after the railway was relocated. Image: circa 1890, from a contemporary newspaper.
Railway civil engineer John Edward Schwitzer had the solution to the problems. Born in Ottawa in April 1870, Mr. Schwitzer entered the service of the Canadian Pacific Railway in 1899. In only eight years at the railway, Mr. Schwitzer rapidly rose through the ranks to the senior engineering post on CPR's Western Lines. It was in this position that he was confronted with the challenging task that would lead to a spectacular engineering accomplishment.

The solution proposed by Schwitzer to eliminate the steep grade of the Big Hill was based on the Swiss example of "spiral tunnels". Specifically, the line was doubled back upon itself to create four new miles, allowing a more leisurely grade than the "Big Hill" afforded. The new eight mile alignment, upon which work began in 1907, followed a consistent grade of 2.2 per cent. The net effect was to add capacity to the CPR main line, as it not only increased the capacity of contemporary locomotives in terms of hauling power, but provided for safer and additional train operations over this section of the line. (2)

The contract for construction of the tunnels was awarded to MacDonnell, Gzowski and Company of Vancouver and work started in 1907. The labor force amounted to about a thousand and the cost was about 1.5 million Canadian dollars. (3) The cost in today’s dollars would be in excess of $300 million. (4) The construction included the boring of the 179 foot long tunnel through the nose of Cathedral Mountain, 1.5 miles west of the Lower Spiral Tunnel, as well as building of the 8 miles of new grade. Over the years, CPR has incurred additional expense in lining the tunnels with concrete, enlarging the bore size to accommodate double-stack container trains and replacing the wooden ties with steel ties to reduce maintenance requirements.

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Schematic of the 1884 Old Line, 1909 New Line & Spiral Tunnels, 1950’s Trans-Canada Highway (5)
As completed, the Upper Spiral Tunnel through Mount Cathedral was 3,255 feet in length carrying the track through 288 degrees of curvature and a difference in elevation of 56 feet. The Lower Spiral Tunnel, through Mount Ogden, was 2,922 feet long, possessing 226 degrees of curvature and a vertical difference of 50 feet. Apparently no photographs exist of the tunnel under construction. The now famous "Spiral Tunnels of the CPR" saw their first traffic on 01 September 1909, and continue to be an integral part of the CPR’s main line operation today. The portion of the 1884 ‘old line’ railway route from Wapta Lake to Cathedral was used for construction of the Trans-Canada Highway in the 1950’s. The Town of Field, B.C., which was a major hub of railway activity in the days of steam locomotives, continues today to serve in a much diminished role as a CPR division point for Calgary and Revelstoke crew changes.

On 05 September 2009, in recognition of the centennial of the opening of the Spiral Tunnels, Canadian Pacific Railway operated a ‘Spiral Tunnels Centennial Special’ from Banff, Alberta, to Field, B.C., and return. The 12 car passenger special on this day consisted of (equipment normally in the consist of the ROYAL CANADIAN PACIFIC shown in brown; normally in the consist of the EMPRESS shown in blue):

- CP FP9A # 4106
- CP GP38-2 # 3084
- CP FP9A # 4107
- CP 95 Baggage-Generator Car
- CP 102 Coach ERNEST ‘SMOKY’ SMITH VC (nee-CNR Coach 5618)
- CP 100 (ex-NSRX 9107 Baggage SHOREVIEW; nee-NYC 9107) – used for observation
- CP 101 Coach DOMINION (nee-CNR Coach 5594)
- CP 99 Baggage/Tool Car (nee-Union Pacific 5655) – used for CPR display car
- CP 103 (ex-RPCX 5503 Coach; nee-Union Pacific 5503)
- CP 104 (ex-RPCX 5534 Coach; nee-Union Pacific 5534)
- CP 82 Business Car STRATHCONA
- CP 77 Business Car VAN HORNE
- CP 78 Business Car ROYAL WENTWORTH
- CP 85 Dining Car CRAIGELLACHIE
- CP 74 Business Car MOUNT STEPHEN

The oldest cars in the consist, both built at CPR’s Angus shops in Montreal, the (Royal) Wentworth and the Mount Stephen, date from 1926; the FP9A’s, built for CNR, date from 1957. Cars CP 100, 103 and 104, cars formerly leased by CP, have recently been purchased by CP.
The train, CPR No. 25B-05 WEST, with CP 4106, 3084, 4107 plus 12 cars, departed Alyth, Calgary at 09:15 and arrived in Banff (above), 82 miles distant, at 11:25 where over 200 passengers embarked; the train departed for Field just after noon.
At 13:08, after travelling along the Bow River, the special climbs the north track west of Lake Louise (above) to the Great Divide before heading down the grade into the upper reaches of the Kicking Horse Canyon and passing through the Spiral Tunnels before a 14:17 arrival in Field, B.C.
Field, B.C., was a hub of activity on this day: tents were set up for various venues; the Calgary Fiddlers played, Jered Hoskins and his fellow modelers of the Kicking Horse Model Railway Club had their 20 x 34 foot HO model of the Spiral Tunnels set up and in operation in one of the tents; CP had Olympic Unit 8861 on display; visitors could view the excellent CPR historical display set up in Baggage Car 99. The Canadian Pacific Railway, Yoho National Park, the Friends of Yoho and the many community volunteers did an outstanding job of hosting the 500 or more visitors that were on the site at any given time of the day!

Images: All images by author except the 1890 photo, page 2.

References:

(1) Don Thomas, Canadian Pacific Railway
(2) Canadian Railway Hall of Fame
(4) Bank of Canada Inflation Calculator

Photo Left: With Castle Mountain looming overhead, CPR Train 26B-05, the eastbound ‘Spiral Tunnels Centennial Special’, returns from Field to Banff; at Johnston Creek, M 96 Laggan Subdivision. 18:42 05 Sep 2009