

Railway Operators in Japan 2

Hokkaido

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Overview

General description of Hokkaido

Surrounded by the Pacific Ocean, the Sea of Japan and the Sea of Okhotsk, Hokkaido is the northernmost island in the Japanese archipelago with an area of 83,452 km², representing 22% of the nation's total land area. Although Hokkaido is the largest of all 47 prefectures in Japan, its population is just 5.7 million, representing only about 4.5% of the national total—the population density is just 20% of the average. Agriculture, fisheries, and forestry are the major industries, and the scenery is still largely untouched with wild mountain areas, wetlands, and natural lakes. Several port cities have active industrial sectors, but most Japanese generally visualize

Hokkaido as vast fields and verdant nature. Amidst the Japanese economic recession, Hokkaido is suffering from a stagnant economy. Moreover, the centralization of economic activity and population in Sapporo, the prefectural capital, is a concern. For example, Sapporo has 1.76 million inhabitants while the second and third largest cities of Asahikawa and Hakodate have just 0.36 million and 0.30 million, respectively.

Outline of railways

Railways in Hokkaido have a total length of 2702.0 km of which 2499.8 km (on 1 April 2001) are operated by JR Hokkaido, which was established in 1987 after the breakup and privatization of Japanese National Railways (JNR). The sparse population makes it difficult to operate

profitable private railways in Hokkaido. In the 1950s, several private railways hauled coals from Hokkaido's coalmines, and also provided local passenger services. However, most freight railways closed after the decline of the coal industry and as private cars became increasingly common.

JR Hokkaido has three major railway functions—to link Sapporo with other major cities in Hokkaido and the main island of Honshu; to provide transport in urban areas of Sapporo; and to provide local transport in other rural regions.

The four other private railway operators in Hokkaido have just 202.2 route-km. To stem mounting losses, JR Hokkaido gave its Chihoku Line to the local government in 1989 and it was renamed the Hokkaido Chihoku Highland Railway. The line

Size and Financial Status of Railways in Hokkaido

	Route-km	Number of Employees	Capital (¥1,000)	Operating Revenue (¥1,000)		Operating Expense (¥1,000)		Operating Profits/Losses (¥1,000)		Ordinary Profits/ Losses (¥1,000)
				Railway	Non-railway	Railway	Non-railway	Railway	Non-railway	
JR Hokkaido	2,499.8	10,071	9,000,000	89,265,972	9,932,704	121,251,620	10,672,973	-31,985,648	-740,269	1,989,148
Hokkaido Chihoku Highland Railway	140.0	104	499,950	279,383	2,256	775,039	—	-495,656	—	-474,339
Sapporo City	48.0 (Subway) 8.5 (Tramway)	—	—	39,266,394	10,062,742	42,453,536	14,060,712	-3,187,142	-3,997,970	-26,728,585
Hakodate City	10.9	—	—	1,314,804	1,270,724	1,448,409	1,809,169	-133,605	-538,445	-638,722

Passenger Volume and Density by Railway Company

			1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
JR Hokkaido	No. of Passengers (1,000)		103,035	109,954	116,368	122,622	125,941	127,602	129,393	129,130	124,644	124,544
		Passenger Density*	4,455	4,826	4,991	5,076	5,030	5,026	5,124	5,173	4,995	4,975
Hokkaido Chihoku Highland Railway	Volume Density		904	1,027	943	903	880	866	816	765	698	678
			516	476	439	472	462	456	431	406	372	361
Sapporo City Transport Bureau	Subway	Volume	272,980	275,579	283,818	275,180	270,159	271,134	281,364	269,110	260,482	251,913
		Density	83,777	88,069	90,270	88,092	86,457	82,060	79,852	76,934	74,062	72,209
	Tramway	Volume	9,415	18,612	9,667	9,455	9,297	9,053	9,354	9,055	8,824	8,706
		Density	7,365	7,449	7,717	7,568	7,432	7,227	7,409	7,182	6,982	6,879
Hakodate City Transport Bureau	Volume Density		8,803	8,583	8,678	8,683	8,705	8,258	8,317	8,175	8,431	7,743
			4,194	4,381	4,418	4,922	6,563	6,226	6,255	6,164	6,356	5,838

Note: Passenger Density = Daily Passenger-km/Route-km

offers local passenger transport between the cities of Kitami and Ikeda in eastern Hokkaido.

The Sapporo and Hakodate local governments operate subways and trams in each city. In Kushiro, Taiheiyo Coals & Transportation operates a local freight line with no connections to other lines.

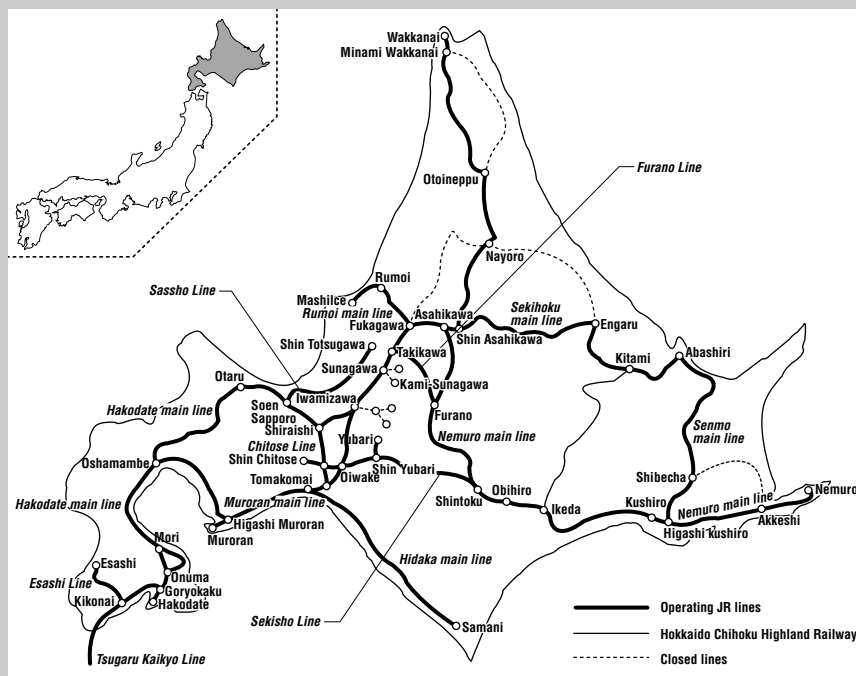
Interurban Transportation

In recent years, JR Hokkaido has been knuckling down to rebuilding transportation links between Sapporo and other local cities. Hakodate, Muroran, Asahikawa, Nayoro, Kitami, Obihiro, and Kushiro are all linked with Sapporo by fast limited-express trains running on narrow-gauge tracks (1067 mm).

Sapporo–Asahikawa

The first line to be speeded-up by JR Hokkaido was between Sapporo and Asahikawa. In Hokkaido, most lines are non-electrified single-track sections, but this section has been electrified and double-tracked. The limited express *White Arrow* and *Lilac* used to travel on this section. In 1990, the Series 785 *Super White Arrow* started operation at maximum speeds of 130 km/h, helping to counter passenger losses to the Sapporo–Asahikawa section of the Doo

Railway Lines in Hokkaido



Expressway opened in the same year. The *Super White Arrow* expresses complete the 136.8-km journey in 1 hour and 20 minutes at a schedule speed of 102.6 km/h. The train timetable is also very convenient with hourly departures in both directions between 08:00 and 21:00. The *Lilac* limited express still provides supplementary services with 30-minute departures from stations that are not served by the *Super White Arrow*. There are 26 daily roundtrips between the two termini.

Sapporo–Hakodate

JR Hokkaido's recent efforts to cut travel times on difficult non-electrified single-track lines are of special note. During its last days, JNR tried to speed-up services by experimenting with introduction of new rolling stock. JR Hokkaido strengthened these efforts by adding more powerful traction units and better track facilities. For example, the number of sections with speed limits such as station yards and curves have been reduced by improving the track characteristics. For higher speeds through



Series 785 EMU *Super White Arrow* limited express on Hakodate main line (JR Hokkaido)



Series 781 EMU *Lilac* limited express on Hakodate main line. This train serves as *Airport rapid* service on Chitose Line. (JR Hokkaido)

curves, a new Series *Kiha* 281 pendulum DMU with two engines each with a rated capacity of 355 PS was developed over an arduous 3-year period.

The many non-electrified single-track sections on the two routes between Sapporo and Hakodate via either the Hakodate main line or Muroran main line were believed to prohibit the possibility of speed increases. Services at maximum speeds of 120 km/h by the conventional *Hokuto* (Ursa Major constellation) limited express used to take 3 hours and 47 minutes but the start of the Series *Kiha* 281 pendulum DMU *Super Hokuto* limited express in 1994 cut times to about 3 hours. Although the *Super Hokuto* is a DMU, its maximum schedule speed of 106.8 km is still faster than that of the AC electric Series 785 *Super White Arrow*. The seven daily roundtrips between Sapporo and Hakodate by the *Super Hokuto* have been so popular that air services between the two cities have been suspended.

In addition, an improved Series *Kiha* 183 still makes three daily roundtrips in 3 hours and 30 minutes at maximum speeds of 130 km/h between Sapporo and Hakodate. Despite its higher maximum speed, the longer travel time of the non-pendulum *Hokuto* is due mostly to the large speed reduction on curves, demonstrating the effectiveness of the *Super Hokuto* pendulum.

Furthermore, the Series 781 *Suzuran* (Lily of the Valley—*Convallaria majalis*) limited express makes five daily roundtrips at a maximum speed of 120 km/h between Sapporo and Higashi Muroran. This series of EMUs was manufactured in the JNR days so the *Super Hokuto* and *Hokuto* DMUs run on this section at higher speeds than *Suzuran* EMUs.

Sapporo–Obihiro/Kushiro

The next lines targeted for speed increases were the lines to Obihiro (220.2 km from Sapporo) and Kushiro (348.5 km from Sapporo). The same types of improvements as described above were made to both rolling stock and track infrastructure between 1993 and 1996. In 1997, a remodelled Series *Kiha* 281 pendulum DMU was put into service as the Series *Kiha* 283 *Super Ozora* (Super Big Sky) limited express. The pendulum tilt was increased to 6° from 5° and self-steering bogies were installed to increase the maximum speed to 130 km/h, cutting the travel time from Sapporo to Kushiro from 4 hours 25 minutes to 3 hours and 34 minutes with four daily roundtrips. *Super Ozora* services between Sapporo and Obihiro, which is *en route* to Kushiro, take 2 hours and 9 minutes.

There were a few trains operated with existing rolling stocks until 1 July. Now, the *Super Ozora* operates Six daily

roundtrips.

The convenience of services between Sapporo and Obihiro is also greatly improved by five daily *Tokachi* (place name) and *Super Tokachi* roundtrips. From the one daily Obihiro arrival and departure, the number rose to five daily roundtrips in 1990, increasing the number of daily roundtrips between Sapporo and Kushiro from 7 to 11. This increase was made in an effort to compete against highway buses and proved successful in maintaining the line's superiority on this route.

Sapporo–Nayoro/Wakkanai

The Sapporo–Nayoro/Wakkanai section was speeded-up in the same manner as described above but since the Sapporo–Asahikawa section was already ready for high-speed operations, improvements to track facilities were only needed in the Asahikawa–Nayoro section (76.2 km). However, the Nayoro–Wakkanai section had very low demand, so no ground facility improvements were made and a simplified Series *Kiha* 261 *Super Soya* (place name) DMU was introduced in 2000. Instead of using pendulum tilting to improve speed on curves, the Series 261 uses bogie air springs to control the degree of tilting to 2°. The *Super Soya* makes two daily roundtrips between Sapporo and Wakkanai with a travel time of 4 hours and 58 minutes. The time



Series 281 pendulum DMU *Super Hokuto* limited express on Hakodate main line (JR Hokkaido)



Series 183 DMU *Okhotsk* on main line

(JR Hokkaido)

between Sapporo and Nayoro is 2 hours and 14 minutes. These services are supplemented by one daily roundtrip *Sarobetsu* (place name) limited express and one *Rishiri* (place name) overnight limited express. The *Sarobetsu* Sapporo–Nayoro and Sapporo–Wakkanai services take 2 hours and 38 minutes and 5 hours and 30 minutes, respectively. These timetables might not seem very convenient but conditions have improved immensely from when there were no limited express trains on this section.

How much did the speed increases cost and where did the funding come from? The Sapporo–Hakodate improvements to track facilities alone totalled approximately ¥7 billion. To reduce the burden of such a large investment, JR Hokkaido asked the prefectural government and local authorities for assistance. The Doto High-Speed Railway Development Corporation was established by JR Hokkaido, Hokkaido Prefectural Government and the cities of Kushiro and Obihiro to help finance the total construction costs of ¥10.7 billion. JR Hokkaido operates the train services by paying track fees to the company. This method was also used for the Asahikawa–Nayoro improvements. In this case, both the ¥3.2 billion cost of improved track facilities and the ¥1.76 billion cost of rolling stock were born by the Hokkaido High-Speed Railway Development Corporation with JR Hokkaido paying track and rolling stock fees. In recent years, other parts of Japan have started to adopt similar methods in which localities benefiting from better railway services bear an appropriate part of the financial burden.

Sapporo–Kitami/Abashiri

The Series *Kiha* 183 *Okhotsk* limited express makes five daily roundtrip runs from Sapporo through Asahikawa to Kitami (321.5 km) and on to Abashiri (374.5 km). So far, the track facilities on



Series 261 DMU *Super Soya* on Soya main line

(JR Hokkaido)

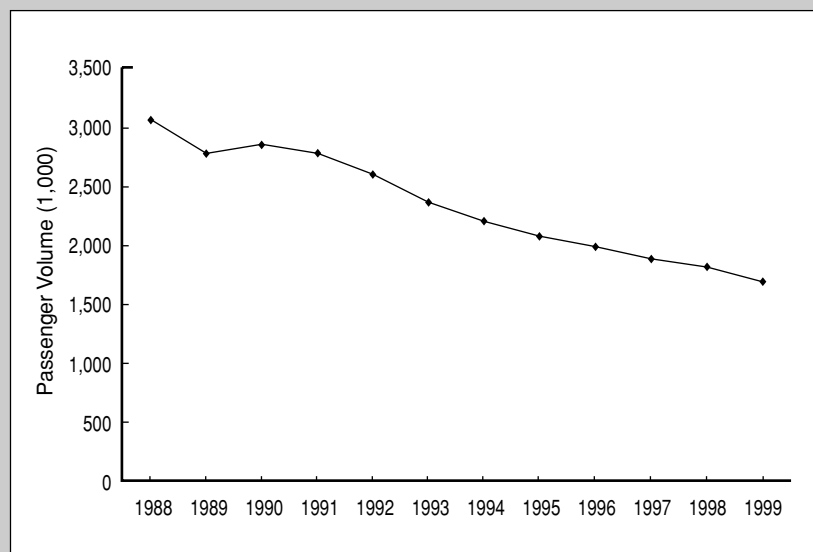
this route have not been upgraded for high speeds and the best travel times to Kitami and Abashiri are 4 hours and 26 minutes, and 5 hours and 15 minutes, respectively. One roundtrip is an overnighter with sleeping cars coupled to ordinary passenger carriages. The scheduled speed of this overnight *Okhotsk* service is slower than the daytime services to give passengers more convenient departure and arrival times. The *Marimo* (Sapporo–Kushiro), *Rishiri* (Sapporo–Wakkanai), and

Hamanasu (Sapporo–Hakodate/Aomori) express all adopt the same lower schedule speed for the same reason.

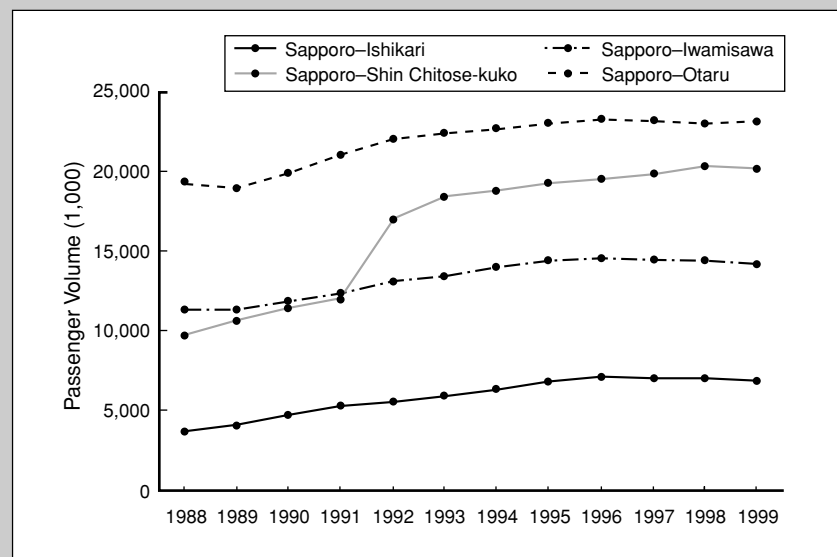
Rail Transport to Honshu

All railway transport between Hokkaido and the main Japanese island of Honshu has been through the 53.85-km long Seikan Tunnel under the Tsugaru Strait since 1988 when the tunnel opened. The tunnel had

Cange in Passenger Traffic through Seikan Tunnel



Change in Annual Passenger Volume in Sapporo Metropolitan Area



been proposed before WWII but the tragic loss of 1155 lives when the *Toya maru* ferry sank in a typhoon in 1954 pushed the tunnel project forward. Preliminary boring started in 1964 and the tunnel was finally broken through in 1985 at a total cost of ¥538.4 billion. After the Minister of transport gave instructions in 1972 that shinkansen services should run through the tunnel, shinkansen facilities were incorporated in the design. However, operations are still running on narrow-gauge track until new shinkansen lines reach the tunnel portals. (A full description of the tunnel history and structure and is given on pp. 146–148 of *A History of Japanese Railways 1872–1999*.)

Seikan Tunnel trains

Passenger and freight trains passing through the Seikan Tunnel are completely separate. The loco-hauled *Kaikyo* (Strait) passenger train makes seven daily roundtrips between Aomori and Hakodate (160.4 km) in a time of 2 hours and 40 minutes. In addition, four Series 485 *Hatsukari* (First Wild Geese) limited express EMUs connect directly with Tohoku Shinkansen services arriving at Morioka and travel through the tunnel to Hakodate. The *Hamanasu* (Sweet-brier)

overnight sleeper makes one roundtrip between Sapporo and Aomori.

There are also sleeper limited expresses linking Osaka and Tokyo directly with Sapporo. The first *Hokutosei* (Pole Star) services between Tokyo (Ueno Station) and Sapporo used loco-hauled Series 24 passenger carriages remodelled for cold climates with most carriages converted to luxury compartments as a marketing point. The only train making the roundtrip between Hakodate and Osaka with departures from and arrivals at Aomori was the *Nihonkai* (Sea of Japan) limited express. This service was soon followed by the *Twilight Express* between Osaka and Sapporo. It was also configured from remodelled Series 24 passenger carriages but had even more luxurious facilities. The train schedule was irregular because it ran exclusively for tourists.

After 10 years, JR East announced a *Hokutosei* renewal plan and manufactured the Series E26 *Cassiopeia* for these prestige services.

The tunnel is very convenient for freight haulage because there is no need to load freight wagons onto train ferries. The freight trains are operated by JR Freight and most are container trains. To haul both passenger trains and freight trains, the Class ED 75

AC electric locomotive was remodelled as the Class ED 79 to run through the undersea tunnel. The Class ED 79 is expected to be replaced by the more powerful Class EH 500 in the near future.

Problems of Seikan Tunnel

The Seikan Tunnel operation results show that it faces serious economic problems. In passenger transport, most people (90%) travel between Hokkaido and Honshu by air because the rail travel times are very disadvantageous. For example, the fastest possible train journey between Tokyo and Sapporo is to ride the *Yamabiko* (Mountain Echo) Tohoku Shinkansen, transfer to the *Hatsukari* limited express at Morioka, and then transfer to the *Super Hokuto* at Hakodate—taking more than 10 hours and 30 minutes. By air, the journey is about 3 hours and 30 minutes, including airport access times. In terms of fares, railways are very much more expensive than air, especially because airline deregulation and severe competition on the Tokyo–Sapporo route have resulted in heavy discounting. Although the difference in recommended air and rail fares seems small, the actual ‘street’ price of air tickets is much lower than the price of rail tickets. The Osaka–Sapporo and Tokyo–Hakodate routes suffer from the same problems. Since it is almost impossible to compete with airlines in long-distance intercity transport, some people are working to stimulate active business exchange between Aomori and Hakodate by creating one economic zone that utilizes the Seikan Tunnel. However, the outlook is grim. Although the *Cassiopeia* sleeper is popular, it offers no hope of relieving the problems because the number of passengers it can carry is limited by the number of luxury compartments. As a result of these factors, the number of passengers using daytime rail services between Tokyo/Osaka and Sapporo is declining every year.

Despite JR Freight’s poor results resulting

from Japan's prolonged recession, many more freight trains (up to 52) pass through the Seikan Tunnel each day than passenger trains. Although the domestic shipping industry still has the lion's share of Honshu-Hokkaido freight transport, annual railway volumes now exceed 5 million tonnes, which is a substantial increase from pre-tunnel days.

Maintenance and improvement of tunnel facilities are also big issues. Although the tunnel opened to operations just 10 years ago, some parts date from the beginning of construction in 1964 and aging is starting to pose problems. It has been agreed that JR Hokkaido will be responsible for tunnel maintenance and improvement, but it is difficult to allocate the required funds due to stagnant passenger demand. In addition, the maintenance costs are enormous because the tunnel is designed to accommodate future shinkansen services. Despite JR Hokkaido's plea for government help, the situation is still undecided.

Transportation in Sapporo Area

The trend towards over-concentration of population in Sapporo is becoming more and more serious, and although Hokkaido's population trend is flattening out as a whole, Sapporo's population is still rising. In response to such conditions, JR Hokkaido is making efforts to meet the commuting needs of workers and students in the Sapporo area. Based on JR Hokkaido's train network, urban Sapporo extends to Otaru (33.8 km from Sapporo) and Iwamisawa (40.6 km) on the Hakodate main line, to Ishikari Tobetsu (27.5 km) on the Sassho Line, and to Shin Chitose-kuko (46.6 km) on the Chitose Line. JNR's former urban train timetable was not planned for commuting purposes especially because the number of passengers was smaller than today. However, during the last days of 1986,

JNR started responding actively to passengers' demands by building new stations and increasing the number of train services. JR Hokkaido's present efforts are a continuation of JNR's policies.

Improving facilities

Sapporo's new station was completed in 1988, tracks in the city were elevated and the section shared by the Hakodate main line and Chitose Line between Sapporo and Naebo was quadrupled. In addition, a third track was added to the section between Sapporo and Soen for exclusive use by through trains to the Sassho Line. These improvements eliminated the bottleneck near Sapporo Station. Other facilities have been actively improved, including elevation and double-tracking of the Sassho Line. The huge capital costs of these improvement projects were shared between the city planning office, other public projects and JR Hokkaido.

Improving carriages

During the JNR days, to keep passengers warm in the cold winter climate, most carriages in suburban areas around Sapporo had just two doors on one side and footsteps at both ends. Although heat saving, such a design does not meet the needs of quick high-volume boarding and disembarkation. As a result, station standing times were longer than average and delayed smooth operations. Furthermore, many passenger trains were still hauled by electric locomotives. In addition to the poor acceleration and deceleration characteristics of loco-hauled trains, train turnaround times at the terminus are greatly delayed by the need to reattach the locomotive to the other end of the train. Right from the start, one of JR Hokkaido's main priorities has been to switch from loco-hauled trains to multiple units.

With the completion of elevated tracks around Sapporo Station in 1988, new Series 721 commuter trains were

introduced. Although the cars still had footsteps, there were three doors on one side, which greatly improved passenger flow. In addition, the train had a maximum speed of 130 km/h and good acceleration, contributing greatly to a better train timetable. The Series 721 remained in production for a number of years and comprised most passenger trains in the Sapporo region. The Series 731 appeared in 1997 and has more features suiting urban transport. Carriages have the same three doors on one side as the predecessor Series 721 but no footsteps. In order to shut out the severe winter cold, air curtains are installed above the door entrances. The seat arrangement was also changed. Instead of conventional cross-seating facing the direction of travel, side bench seats like those in Tokyo commuter trains are used. This caused some controversy about service deterioration due to the fewer available seats but it does contribute to smoother passenger flow.

The Series 731 can also be operated in conjunction with a DMU. The Series 731 operates mainly between Sapporo and Otaru but urban sprawl is bringing more passengers from non-electrified sections past Otaru. There have been direct services to Sapporo by diesel loco-hauled trains, but the timetables were limited by the lower performance than electric trains. To solve this problem, Series 201 diesel cars with a similar body to the Series 731 and that could be coupled to the Series 731 were developed. Since coupled Series 201 diesel cars must match the speed and high acceleration and deceleration of the Series 731 electric cars, each diesel car has two high-power engines rated at 450 PS as well as a mechanism permitting a maximum tilt of 2° to increase speed through curves. The device is simpler than the pendulum tilt mechanism and achieves tilting by inflating air springs on the bogies.

The improvement to facilities has facilitated addition of extra services,



Series 201 DMU coupled with Series 731 EMU on Hakodate main line. (JR Hokkaido)



Series 721 Airport rapid service on Hakodate main line

(JR Hokkaido)

especially on the Sassho Line (where some sections have seen a tripling of service frequency over the past 15 years), which in turn has necessitated more rolling stock. To meet this need, surplus passenger carriages were remodelled into the Series *Kiha* 143 DMUs with new driving gear and driving seat, permitting cost reductions in manufacturing.

Airport Access

New Chitose Airport is the major airport for the Sapporo area. (The other is Okadama Airport.) The first railway access to the airport was possible when Chitose-kuko Station (now Minami Chitose Station) was opened in 1980. When a new terminal building was built at a different location, a new underground line (2.5 km) was opened between

Minami Chitose Station and the new Shin Chitose-kuko Station. The opening of Shin Chitose-kuko Station saw the start of *Airport* rapid-transit services at 15-minute intervals in each direction from 08:00 to 19:00 to and from Sapporo with a travel time of 36 minutes. Among the four hourly *Airport* Sapporo–Chitose rapid services, at least one runs directly to and from Otaru, and another to and from Asahikawa. The latter becomes *Lilac* limited express (surcharge payable) between Sapporo and Asahikawa. Due to the excellent rail access, 50% of New Chitose Airport passengers use the railway.

Sapporo and Hakodate Municipal Transport

Sapporo subway

Sapporo City opened a 12.1-km subway in 1971 to become the fourth city in Japan

with a subway. The route length has increased over the years to reach 48.0 km on a network of three lines: the north–south Namboku Line (Asabu–Makomanai, 14.3 km), the east–west Tozai Line (Miyanosawa–Shin Sapporo, 20.1 km), and the north–south Toho Line (Sakaemachi–Fukuzumi, 13.6 km). The three routes operate independently but all pass through the centre of Sapporo City. The trains on these three lines are characterized by solid rubber tyres, which provide low noise, superior acceleration and deceleration, and good adhesion for climbing grades. To cut construction costs, part of the Namboku Line was elevated and covered with an aluminium shelter to prevent accumulation of snow on the tracks. (Sapporo receives an annual average snowfall of 480 cm.)

Although these subway lines carry many more passengers than JR Hokkaido, they



Sapporo City's Namboku Line Series 3000 EMU with rubber tyres running inside the snow shelter
(Sapporo City Transport Bureau)



Sarara Tram running on Susukino district for the first time in 1983
(Sapporo City Transport Bureau)

are also suffering from decreasing passenger numbers, which can be blamed mostly on the economic recession and widespread adoption of a 5-day working week. Another possible cause is the short length of the lines, which all terminate within 10 km of central Sapporo; since the roads in this central area are good, people tend to drive rather than take the subway. Furthermore, although there is concentration of population in Sapporo City, the number of people living in the central area is decreasing. Finally, the subway fares are relatively expensive. As a result, the Sapporo subway faces an increasingly bleak financial situation.

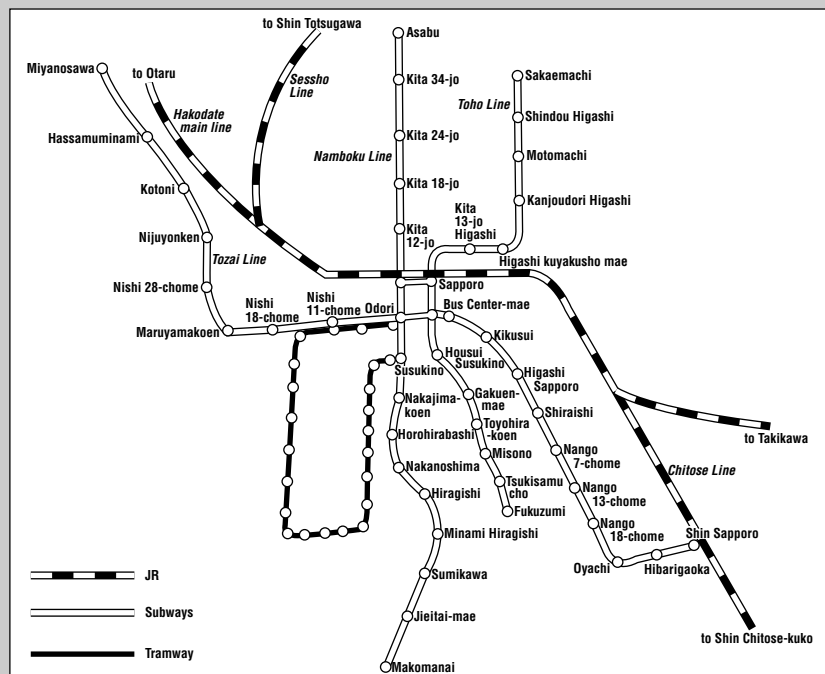
Sapporo tramway

The Sapporo tramway starts from Odori (Main Street) at the city centre, runs westward to the suburban outskirts and then sweeps around in a southerly loop back to the city centre at Susukino near Main Street. The 8.5-km length is almost a closed circle but the line operates a shuttle service due to the small break between Main Street and Susukino. The line has had chequered history with expansion and contraction, and the present route and length were consolidated in 1974. The tramcars and street facilities have been renewed in recent years. The tram stops now have roofs, safety rails, and an information system. Also, the trolley wires were secured to centre poles as a part of a city beautification programme. New cars have air conditioners.

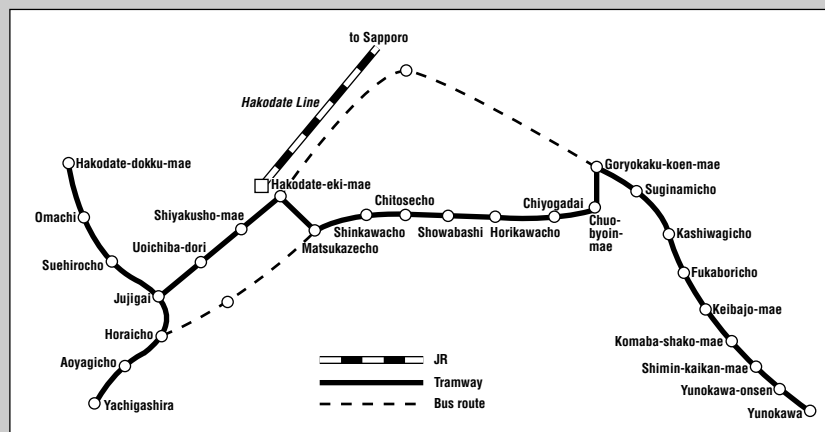
Although the number of tram passengers is decreasing, the low environmental impact and construction cost are merits worth further consideration.

During Sapporo's severe winters, the snow-clearing *Sasara Tram* removes snow on tracks using large rotating brushes at the car front—a unique method of removing snow. The save snow-cleaning trains are also used in Hakodate City but are being replaced by trucks with brushes.

Rail Transport in Sapporo City



Rail Transport in Hakodate City



Hakodate tramway

The Hakodate City Transportation Bureau operates an east-west 10.9-km tramway within the city. It has four lines, formed from two systems. Hakodate has a long history of trams dating back to horse trams in 1897. Electric trams started in 1913 and operation was transferred to the Transportation Bureau in 1943. The line was 17.7-km long in the 1960s, but was reduced as more people owned private

cars. A section was closed in 1993 when the system was reorganized. Operations are facing difficult times and although passenger density was improved temporarily by closing the loss-making section, it has not resolved the root of the problem, which is declining passenger numbers. Although no sudden changes to the trams are expected, the long-term outlook is bleak.

Rural Transport

Line closures

The financial situation of many rural lines in Hokkaido poses a very serious problem. The 1980 Law for Special Measures to Promote JNR Rehabilitation specified closure of all lines and sections with a daily density of less than 4000 passengers/km/day. Hokkaido had 22 such lines and 15 were closed and changed to bus services by JNR. However, JR Hokkaido took over seven such lines (Horonai, Matsumae, Utashinai, Shibetsu, Nayoro main line, Tempoku, and Chihoku). The first three lines were changed to bus transport within the first year of JR Hokkaido operations, but it took much longer to make arrangements with the communities along the four remaining lines, which ran over much longer distances. Finally, it was decided that only the Chihoku Line would continue railway operations due to the strong requests of towns along the line. As a result, the Hokkaido Chihoku Highland Railway was established by joint investment in March 1990 to operate this line. Actual operations started in June of the same year and are described later in this article.

However, even some lines that escaped the 1980 designation as candidates for closure have got in to trouble since the foundation of JR Hokkaido. For example, the Sunagawa–Kami-sunagawa branch section (7.3 km) of the Hakodate main line was closed in May 1994. It was built originally to carry coals and had been hit by a serious drop in passenger numbers since the 1987 coalmine closure. During its last years, the annual revenue from fares had fallen to just ¥1.8 million while operation costs amounted to ¥100 million. Although the operation results were very bad, the line escaped closure for some years because it was treated as a part of the Hakodate main line and the true results were masked by the operation results for the entire Hakodate

main line. JR Hokkaido notified the local community of its intention about 1 year before the planned closure because the 1986 Railway Business Law required the consent of local communities affected by the closure. Similarly, the Shinmei Line (Fukagawa–Nayoro, 121.8 km) was closed in September 1995. It had been carrying less than the 4000 passengers/km/day benchmark when the old JNR had designated lines for closure but escaped because there was no parallel road service. However, the later completion of a parallel road made a switch to bus services possible. The local community was notified of the plan and consented without major friction.

Management by operations offices

There is little room for optimism about the business conditions of many other rural lines and a system of operations offices has been established to promote efficient operation of these lines. Each operations office has a role similar to a small branch office and is authorized by JR Hokkaido Headquarters to manage its line independently by developing local strategies for scheduling trains, managing rolling stock and crew, maintaining facilities and carriages, and planning budgets.

A good example is the Hidaka Line Operations Office (Tomakomai–Samani, 146.5 km), which was established in 1990. Although a main line in name, the Hidaka main line was actually a non-electrified single-track line with no superior train services and flagging passenger volumes. The Hidaka Line Operations Office served as a case study in introduction of efficient management methods. Initially, some people took a dim view of this breakup of company operational unity, but the small locally tuned adjustments made by the Hidaka Line Operation Office produced such astonishingly positive results that the new system now receives high acclaim.

1991 also saw the establishment of the Hanasaki Line Operations Office to manage the Higashi Kushiro–Nemuro

section (132.5 km) of the Nemuro main line, and the Soya Kita Line Operations Office to manage the Nayoro–Wakkanai section (183.2 km) of the Soya main line.

Sightseeing by ‘trolley train’ and steam locomotive

Some lines are attempting to revitalize business by operating special trains catering to tourists, etc. In 1989, the Kushiro Branch Office started running the *Kushiro Moorland Norrokko* on the Kushiro main line with the catch-phrase ‘Japan’s Slowest Train.’ The plan was to offer tourists spectacular views of the beautiful scenery along the line seen from remodelled passenger carriages with no windows. Such open-type trains are called ‘Trolley Trains’ for the rustic sentiment they embody. The ‘Norrokko’ part of the train’s name is a coined term combining *noroi*, a Japanese derogatory term for slow, with *torrokko*, meaning a trolley. This train has proved very popular and although it was planned to run just during summer, it now operates year-round on various lines. The Asahikawa Branch Office has copied this business model and now runs a similar train on their Furano and Rumoi lines.

Operation of restored steam locomotives is also relatively widespread. In 1987, a restored Class C62 steam locomotive, which was the largest steam locomotive to ever run in Japan and holds the world speed record for a narrow-gauge steam locomotive, was returned to service between Otaru and Niseko on the Hakodate main line. The restoration was performed by various volunteer groups and sponsors who appreciated the historic significance of railway preservation. However, due to the long recession, the sponsors were forced to pull out and the train stopped in 1995. Operation using a Class C11 with lower operating costs than the Class C62 was resumed in 1999 on the Rumoi main line catering to tourists and travelling to a destination made famous by a TV programme in which the train itself



Series Kiha 54 DMU running on northern section of Soya main line where Rishiri Fuji (JR Hokkaido)



Steam locomotive Class C 11 hauling seasonal tourist train on Rumoi main line (JR Hokkaido)

appeared. Another Class C11 was restored in 2000. Such sightseeing trains were popular during JNR's last days and seven trains were built to travel to popular tourist resorts. However, long-distance sightseeing trains are not operated frequently today.

Hokkaido Chihoku Highland Railway

As mentioned before, the Hokkaido Chihoku Highland Railway (Kitami-Ikeda, 140.0 km) took over operations of JR Hokkaido's Chihoku Line in 1989. The first step taken by the new operator was to increase the number of trains each day by 50% from 26 to 39. In addition, the company started running one daily express between Kitami and Ikeda, cutting the travel time by as much as 49 minutes. Other timetable improvements were based on the commuting needs of local high-school students and connections to other JR Hokkaido trains. Convenient direct connections with JR Hokkaido services to Obihiro started in 1991.

The company also replaced the old large 20-m railcars from the JR Hokkaido era with smaller, but more efficient 16-m railcars developed by Niigata Engineering Co., Ltd. for use on rural lines nationwide. The design is a 'one size fits all' concept that cuts manufacturing costs by increasing the number of common parts. To reduce staff

costs, the trains have no conductor. Stations were improved in conjunction with local communities by combining them with public facilities, such as auditoriums, to make the station a community centre and increase railway usage.

Despite such efforts, the Hokkaido Chihoku Highland Railway carried just 361 passengers/day/km in 1998, a figure that ranks at the bottom of all rural lines nationwide. The line continues to operate with the support of local communities but the decreasing number of passengers raises the question of how much longer it can survive. ■

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