

~ Railway serious incident that the signal column collapsed and hindered the railway track ~

Railway operator : Hokkaido Railway Company
 Incident type : Facilities damage
 Date and time : At about 12:40, November 9, 2018
 Location : In the premises of Shin-Sapporo station, Chitose Line, Sapporo City, Hokkaido

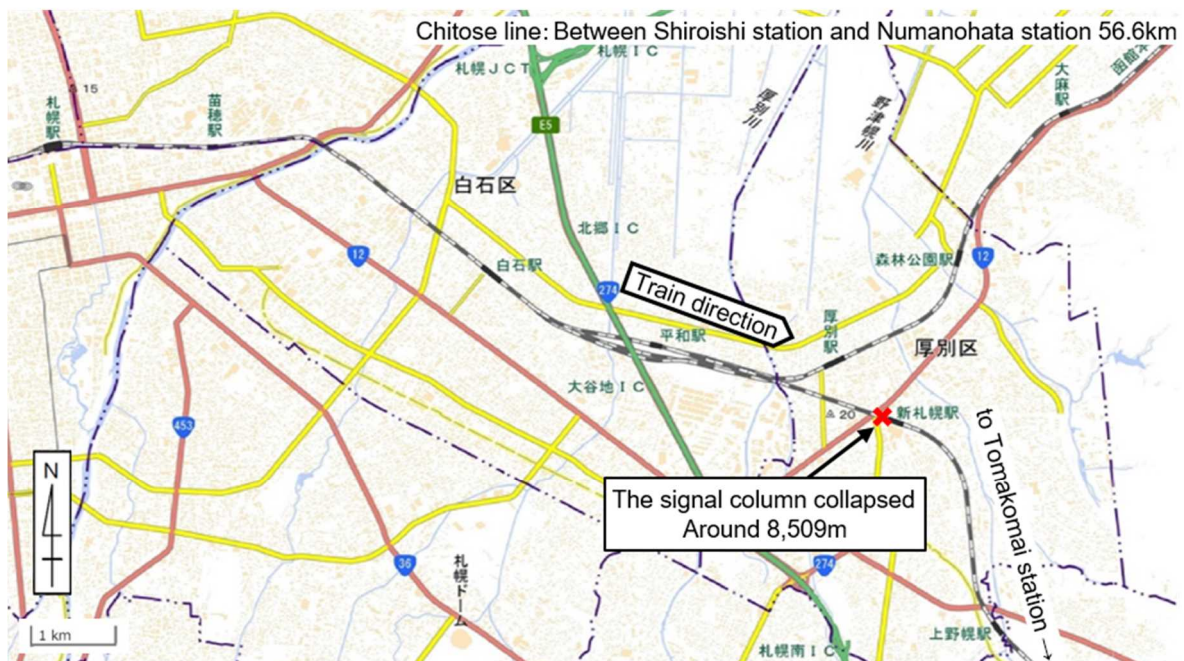
<SUMMARY>

At about 12:40, Friday, November 9, 2018, while the inbound 2760M train, composed of 3 vehicles started from Sapporo station bound for Tomakomai station of Hokkaido Railway Company, was running between Heiwa station and Shin-Sapporo station at a velocity of about 50 km/h, the driver of the train checked the indication of the caution signal in the No.2 home signal of Shin-Sapporo station in order to stop at the station, after that, he found that the column of the No.1 starting signal, planted in the opposite track side, had collapsed and hindered the up and down tracks, from about 200 m before the No.1 starting signal.

Therefore, the driver applied the normal brake and stopped the concerned train, then, he issued the train protection radio and reported to the train dispatcher.

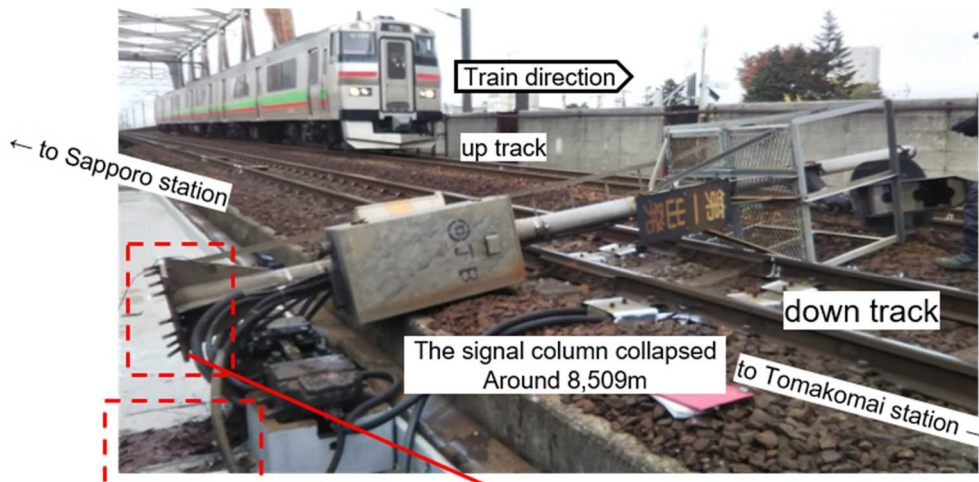
No one was injured in the incident.

<Schematic drawing of the area around the serious incident site>



※This figure was quoted from the map (Digital Land Web) published by Geospatial Information Authority of Japan, and revised.

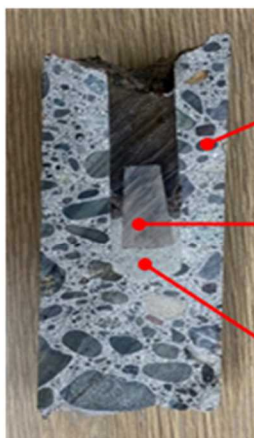
<The situation that the signal column collapsed>



The situation of the concrete structure's surface



The situation of the back side of the signal column's base



Concrete

Cone of metallic expansion anchor

Solidified particulate matter had remained in the hole.
The ingredient of the particulate matter was the same as that of concrete around the hole.



The cone had remained in the hole for inserting a metallic expansion anchor and its cone.

The situation of the hole's inside and the cone

<PROBABLE CAUSES>

It is probable that the concerned serious incident had occurred because there was the inferior construction work as the insufficient cleaning in the hole after drilled into concrete body in the construction work of the metal extension anchor based on the "after constructing anchor method", in the planting work of the down line No.1 starting signal column.

It is probable that the metal extension anchor was in the status as insufficient tolerance against tensile force because the cone of the metal extension anchor had not expanded the swelling part of the anchor due to the inferior construction work when the signal column had been planted.

Therefore, it is somewhat likely that the signal column had collapsed because the external force exceeded the tolerance of the metal extension anchor fixing the signal column of the home signal, as the anchor of the metal extension anchor was loosening gradually, caused by vibration due to running trains on the viaduct in addition to the effects of the external force such as windstorm, earthquake, etc., in the period of about 38 years from planting, in the status that the metal extension anchor supporting the signal column had been insufficient endurance against tensile force, in cooperation with the wind pressure of about 20 m/s instantaneous wind speed on the collapsed day.

<MEASURES CONSIDERED AS REQUIRED TO PREVENT THE RECURRENCE>

It is probable that the concerned signal column became to the situation that it collapsed in the concerned serious incident because the tolerant force against tensile force of the metal extension anchor had been in the status not to satisfy the designed value due to the insufficient construction work of the metal extension anchor implemented by the "after constructing anchor method" in the construction works to plant the concerned signal column.

In order to prevent recurrence of the similar incidents, the company is expected to implement the following measures for prevention of recurrence.

- (1) Implement the construction works certainly satisfying the conditions[#] described in the guidebook, etc., such as the "guide for design and construction of the after constructing anchor", published by the Railway Technical Research Institute, when the heavy structure such as the signal column, etc. are fixed by the "after constructing anchor method", because it is difficult to find out the malfunctions in the periodic inspection, etc., after constructed by the "after constructing anchor method". In addition, the workers who has the license of the works should implement the construction works and store the records.
- (2) Implement the additional reinforcing works in the place where there is high risk as to contact with the train if the signal column etc. fall down, in the places where the metal extension anchor has been used, similar to the concerned signal column, and the place where there is no record to check the contents of the construction works, etc., in the places where the heavy structure such as the signal column, etc., was fixed by the "after constructing anchor method".

Here, it is desirable to implement the measures to prevent the deterioration of the concrete such as the waterproof construction, etc., in order to keep the long range durability of the concrete, when constructed by the "after constructing anchor method".

[#] The "guide for design and construction of the after constructing anchor" prescribed that the metal extension anchor is not suitable because there is a fear to reduce adhering force as the concrete contacting the extended part of the anchor will be damaged and become powdery when the metal extension anchor suffered to the repeating loads by the effects of the vibration and the wind pressure caused by the running train.