Effects of Measures to Secure Road Traffic During Heavy Snowfall on Motor Vehicle Traffic

(Research period: FY 2022 -)

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(Key words) heavy snowfall disaster, measures to secure road traffic, calling for refraining from going out, behavior change

1. Introduction

In recent years, unusually heavy snowfall caused a large-scale standstill of vehicles, which not only greatly affects socioeconomic activities, but also threatens the lives of drivers. Therefore, the Ministry of Land, Infrastructure, Transport and Tourism has enhanced efforts toward the securing of road traffic during heavy snowfall, according to the basic concept of "thoroughly avoiding a large-scale standstill of vehicles on trunk roads, giving top priority to human lives." The NILIM conducts research on the effects of measures to be taken, among varied measures to secure road traffic, focusing on a "calling for refraining from nonessential and non-urgent going out" to be performed by the road administrator, the Japan Meteorological Agency, and others in the joint names, and "preventive traffic control" to perform concentrated and efficient snow removal work.

In this paper, the traffic volume when it was called for on December 18, 2023 to refrain from nonessential and non-urgent going out starting on December 21 in the Hokuriku Region has been compared with the average traffic volume (hereinafter called the "average traffic volume" in December 2022, which was the same month in the preceding year, and the results of analysis of the effects of the calling for refraining from going out on the traffic volume are presented. Note that when calculating the average traffic volume, the traffic volumes on the date of implementation of traffic control in December 2022 and in the year-end period are different from those during ordinary periods, and therefore they are excluded from the calculation.

2. Effects on the traffic volume in city areas

As for the traffic volume in city areas, the traffic volume on National Route 8 in Niigata City was analyzed, and the traffic volume per day in these areas is shown in Fig.-1. The average traffic volumes are prepared and shown in 6 types in total: on the day without accumulation of snow and on the day with accumulation of snow and snowfall, for each of weekdays, Saturdays and Sundays.

The traffic volume of compact vehicles decreased from 21st to 24th as compared with the average traffic volume. The traffic volume of large vehicles was of the same level as the average traffic volume on 21st, and decreased on 22nd. Also, for both compact vehicles and large vehicles, the traffic volumes before and after the date when the traffic volume decreased were of the same level as the average traffic volume, and rushing traffic before refraining from going out or traffic that increases as compared to normal after refraining from going out cannot be identified. From these, it can be assumed that compact vehicles act in response to the calling for refraining from going out and large vehicles determine refraining from going out, observing the status of snowfall, and that there are tendencies in the action of refraining from going out to cancel the action on the day instead of postponing such action.

Fig.-2 shows the traffic volume organized by time

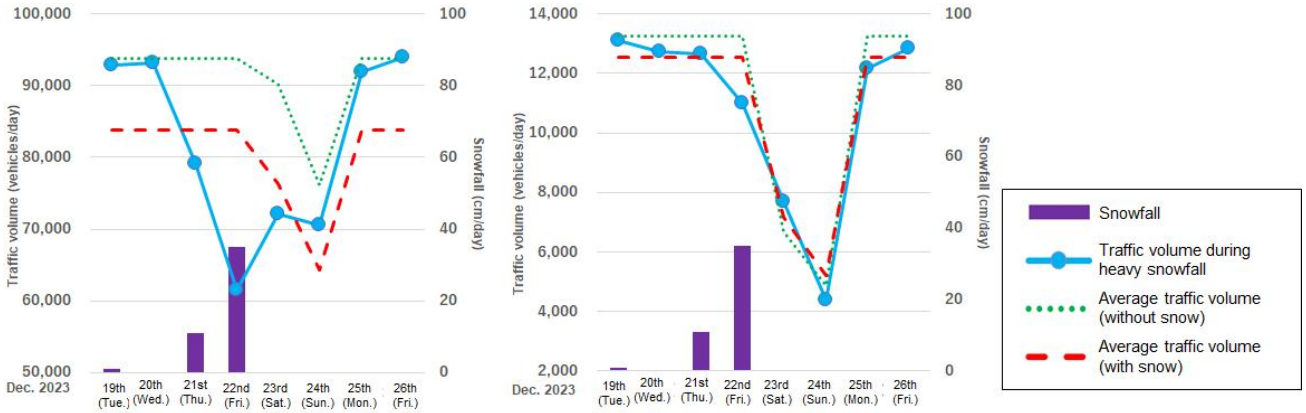

Fig.-1　Traffic volume per day on an ordinary road (National Route 8) in city areas (in Niigata City) [Left: compact vehicles, right: large vehicles]

based on the traffic volume per day of compact vehicles in Fig.-1. Until 20th, the peaks of the traffic volume were identified in the commuting hours to/from work in the morning and in the evening. On the other hand, on 21st when refraining from going out occurred, the peaks in the morning and in the evening disappeared. In addition, there was no great change in the traffic volume during the daytime when compared with that in the preceding day. From these, it is assumed that the details of refraining from going out on 21st were that commutation to/from work or school in the morning and in the evening decreased. On 22nd when the snowfall increased, the traffic volume during the daytime also decreased in addition to that in the morning and in the evening. From this, it is assumed that the details of refraining from going out on 22nd were that, in addition to the cancelling of commutation to work, business activities during the daytime and daily activities such as shopping were restrained.

3. Effects on the traffic volume in the suburbs

As for the traffic volume in the suburbs, the traffic volume on National Route 18 in Myoko City was analyzed. The traffic volume of compact vehicles decreased on 21st and 22nd, which has a tendency similar to that in city areas, but the traffic volume increased on 23rd when snowfall subsided. This could have been caused by leisure demand for ski resorts in the suburbs due to improvement of the weather on 23rd.

The traffic volume of large vehicles organized by time is shown in Fig.-3. In city areas, the traffic volume became less than the average traffic volume after the snowfall increased, whereas in the suburbs the traffic volume decreased before the snowfall increased. The decrease could have been caused in the suburbs by the announcement of the possibility of traffic closure and a planned guidance for the installation of tire chains, in addition to the calling for refraining from going out. In addition, the traffic volume increased during the period of 12 hours from the time right after the change at around 23:00 on 22nd from the heavy snowfall warning to the heavy snowfall caution. From this, there is a possibility that vehicles that had cancelled moving on Friday and had been prepared for departure started moving as soon as the heavy snowfall warning was lifted.

4. Conclusion

In future, we plan to carry out traffic simulation by referring to the effects on the traffic volume by means of the measures to secure road traffic during heavy snowfall that have been obtained in this paper, and to calculate the effects of suppression of temporal loss and economic loss by means of the measures to secure road traffic. We would like to utilize the effects to be calculated for the nourishment of opportunities in which the entire society including general drivers, businesses, schools will actively engage in behavior change.

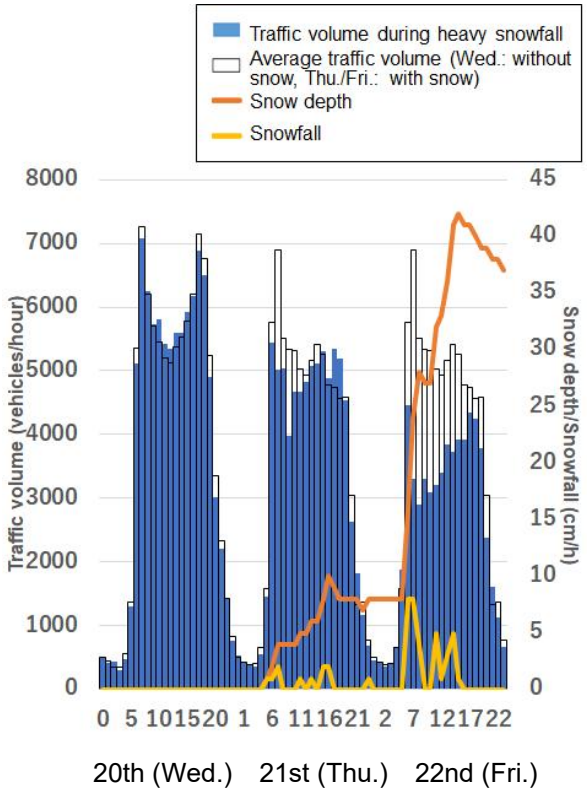

Fig.-2 Traffic volume by time on an ordinary road (National Route 8) in city areas (in Niigata City) [Compact vehicles]

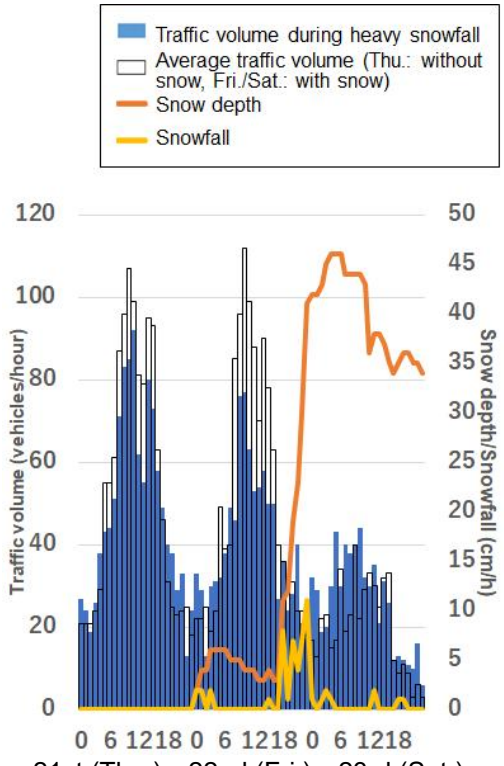

Fig.-3 Traffic volume by time on an ordinary road (National Route 18) in the suburbs (in Myoko City) [Large vehicles]