COMMON USE OF INTERLOCKING BLOCKS IN COLD DISTRICTS

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n recent years, the motorization in Japan, accompanied with an increase of traffic accidents, all inds of pollution and other obstruction to the living environment, gained remarkably. specially wear down of pavements and asphalt dust, caused by spike tires, are serious social prob- ems in cold districts.

o cope with this problem, we executed a test by constructing an experimental pavement using Inter- ocking Blocks.

he experimental pavement was located in the suburb of Sapporo City, in Hokkaido, Most of the cars ver there are using spike tires during the winter season, and the traffic is about 5,000 cars a day. he street were paved with blocks where the asphalt pavement had been leveled down. The thickness the pavement was 80 cm.

e points of research of this test pavement were as follows:
deflection rate 2) slip resistance 3) abrasion rate 4) transversal profile 5) vertical ofile

The result of research were as follows:

1) The pavement was not deeply rutted and the life of block pavements lasts longer than that of asphalt pavements.
2) Abrasion rate is smaller and the dust pollution became less.
3) Slip resistance was larger, which helps to control the car.
4) Not a difference was noticed in point deflection rate and flatness of the pavement, just after the construction and after one year of common use.

INTRODUCTION

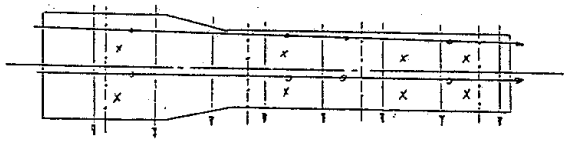
s report is the result of a trial pavement t was carried out by the Japan Association Interlocking Block in December, 1984. The ntity of the interlocking block for 1987 duced in Japan was 3,000,000 m^2. The quan- y for roadways is very small though the ntity demanded is increasing. Much experi- tal data concerning the durability and bility of many types of interlocking block ement (hereinafter referred to as "block") required for the varied diffused use of it. people faith if the product is also neces- y.

ce Japan's Hokkaido region is located in a d district, consideration for the reli- lity for road traffic during winter is uired. Also the security of road traffic a necessary and fundamental concern for ly life and economic activities. Rutting abrasion of road surfaces are dangers in ns of safety, and are causing financial blems due to the necessary repairs and al problems concerning the dust. On the r hand this block is a pavement materials high performance (abrasion resistance, resistance etc.), and the future theme in n is its use for roadways.

trial pavement has been investigated with e points by the Association for interlock- Block, since December, 1984. This report summary of the results of the trial pave- .

2. OUTLINE OF TRIAL

The trial paving was carried out on the principal city road between Makomanai and Shino cities with the cooperation of Sapporo City, in December, 1984. The width is 7.5 m (2 lanes) and the length was 200 m. Fig. 1 shows the measuring points for each trial. The traffic flow volume in this case is 300 large-sized



1 ○ deflection rate
2 × slip resistance
3 - - - abrasion rate
4 → transversal profile
5 ← vertical profile

Fig. 1 Measuring points for each investigation

motor vehicles per day and 5,000 ordinary motor vehicles per day. And the traffic flow of motor vehicles with spiked tires was 800,000 units per day from the middle of November to the middle of April.

The cross-section of pavement structure is shown in Fig. 2 and the pavement surface depth was cut by 10 cm. The block was installed after a 2 cm deep sand cushion was spread. The installation pattern was herringbone bond as shown in Fig. 3. And the block unit used which

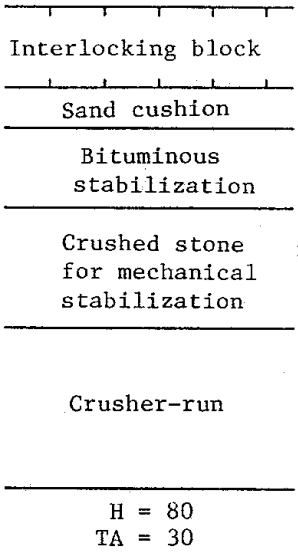


Fig. 2 Cross-section of pavement structure

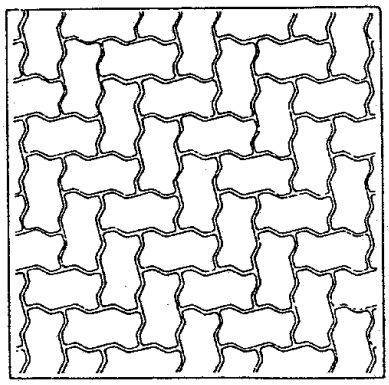


Fig. 3 Installation pattern

hickness of 8 cm. Considering its abrasion istance, the block was made of concrete h a 10 mm aggregate using the single layer ding method (Generally in Japan, double er molded products with a colored layer are main stock.). The materials used (aggre- e, cement) and the mix proportion, were as a standard block.

RESULT OF THE INVESTIGATION

Abrasion of the block

asion of the block was studied along 4 meas- ng lines. And its thickness was measured 8 points by slide calipers and the average ue regarded as the abrasion rate. The sured results are shown in Fig. 4. average abrasion rate was 2.4 mm after one ter and was 7.2 mm after three winters. maximum abrasion rate was 8 mm after one ter and 24.5 mm after three winters. ording to the result of the investigation m 1977 to 1981 in Hokkaido with a daily ffic volume of 5,300, the abrasion rate of halt pavement was about 6 mm after one ter. Therefore this result of the investi-

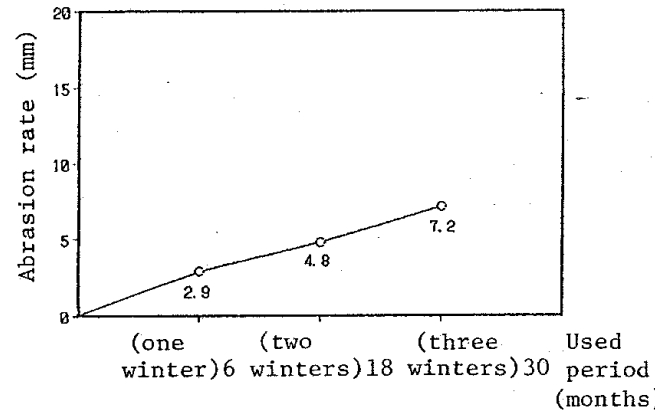


Fig. 4 Measuring results of abrasion rate

gation was sufficiently successful.

3.2 Road surface roughness

The profile of the road surface was measured on transverse and longitudinal measuring lines by a profile meter that is shown in Photo. 1. The road surface roughness is shown in Fig. 5 and the rutting which is considered to be caused by spiked tires was present. On the other hand, the surface smoothness is shown in Fig. 6 and a large change was not seen.

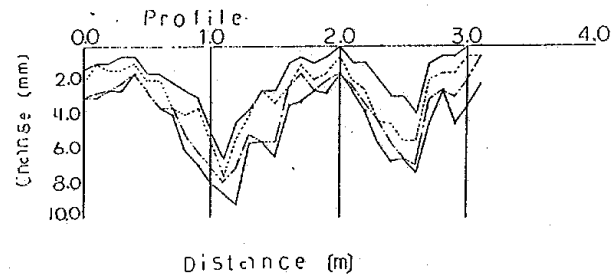
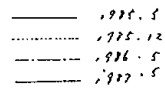


Fig. 5 Transverse profile



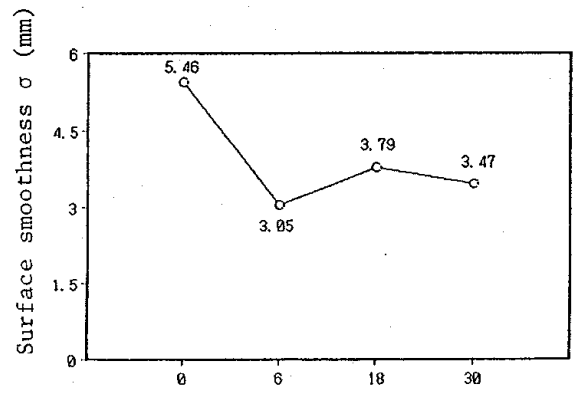


Fig. 6 σ(Surface smoothness) The elapsed change

3.3 Slip resistance

The slip resistance was measured at 8 points by a portable slip resistance tester. The results are shown in Fig. 7. The slip resistance in wet conditions during 30 months of service was 58 ∿ 62 BPN. There is not no large change.

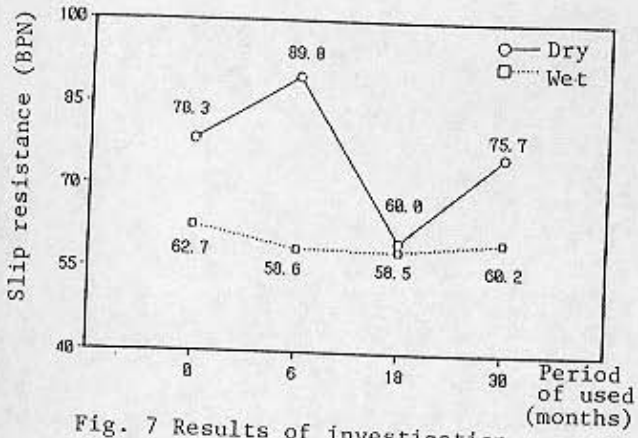


Fig. 7 Results of investigation of slip resistance

3.4 Deflection rate

The deflection testing was carried out by deflection measurement with the Benkelman beam. The results are shown in Fig. 8. The deflection during 30 months of service 0.21 mm → < 0.45 mm and each result is a small value.

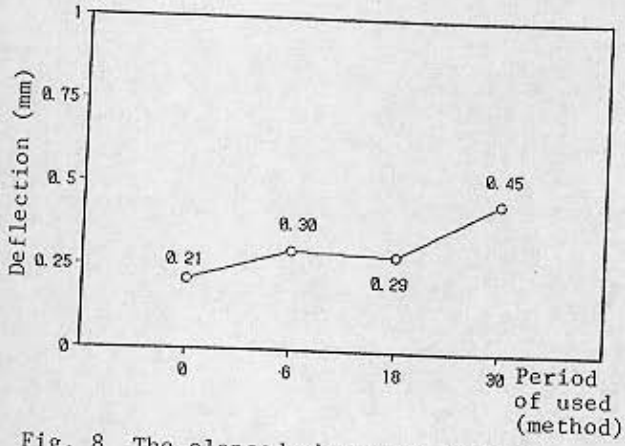


Fig. 8 The elapsed change of deflection

4. CONCLUSION

The results of the investigation for three years are as follows.

(1) The measurement results of the abrasion rate by block extraction was an average 2.4 mm per year. The abrasion resistance is sufficient in comparison with the asphalt pavement.

(2) Concerning the road surface roughness of the block pavement; although there is a small rutting on the transverse lines, there is less change on the longitudinal lines.

(3) The slip resistance shows less change during 30 months of service.

(4) The deflection shows only a small change during 30 months of service.

Sufficient results usability for roadway were obtained by this pilot pavement. Furthermore, it will be necessary to collect more data at various locations.

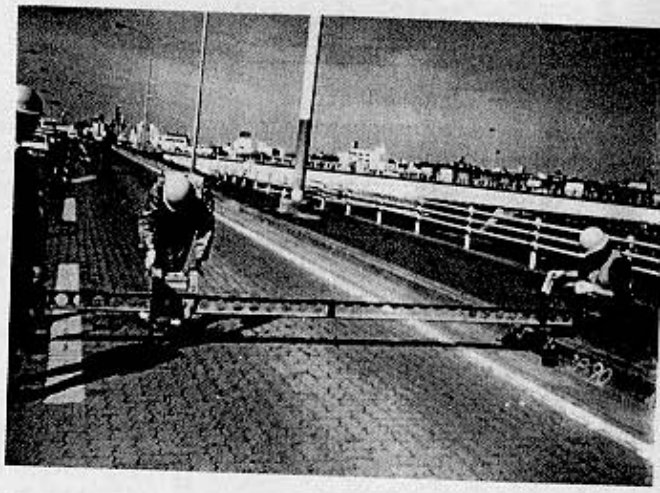


Photo. 1 Test pavement profile being measured