

Freezing prevention pavement using rubber powder

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- 1. Introduction**
- 2. Properties of rubber powder**
- 3. Characteristics of the rubber-powder freezing prevention pavement, and construction methods**
- 4. A trial construction project using rubber-powder freezing prevention pavement**
- 5. Summary of the results**
- 6. Conclusions**

1. INTRODUCTION

Freezing prevention pavement

This pavement minimizes the road surface from freezing.

【Characteristic】

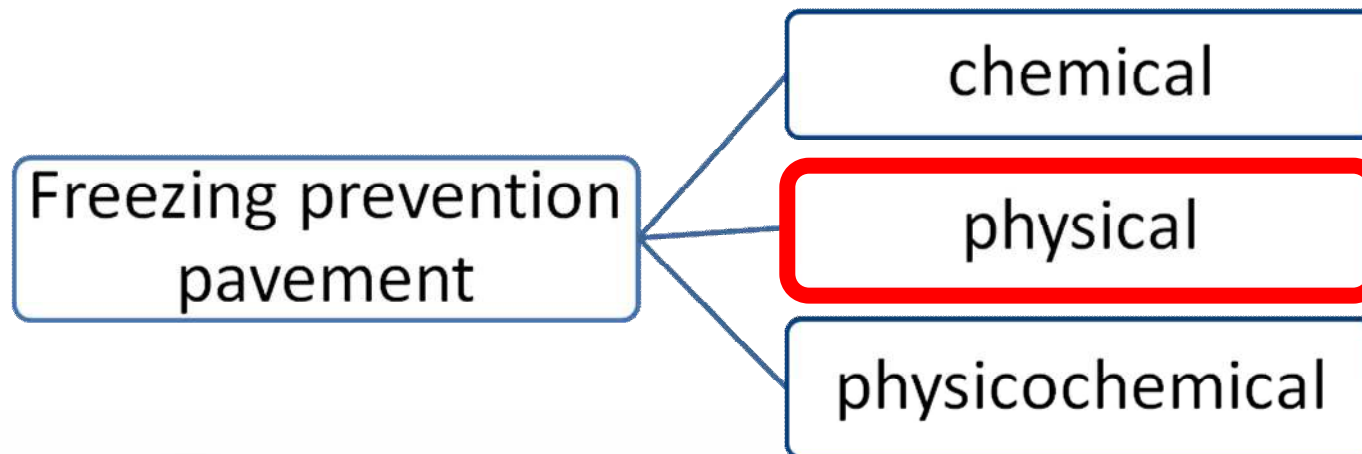
- Improves the efficiency of snow removal
- Enhances traveling safety

But

- Disadvantages of less durability
- High price compared to regular pavements

1. INTRODUCTION

In Japan, various kinds of freezing prevention pavement have been developed.



We have developed a novel freezing prevention pavement containing rubber powder.

2. Properties of rubber powder

Our material uses rubber powder instead of rubber chips.



Rubber powder
(Particle diameter: 0.3 mm or less)



Rubber chips
(Particle diameter: 1 to 5 mm)

2. Properties of rubber powder

□ Particle diameter and skid resistance of rubber powder



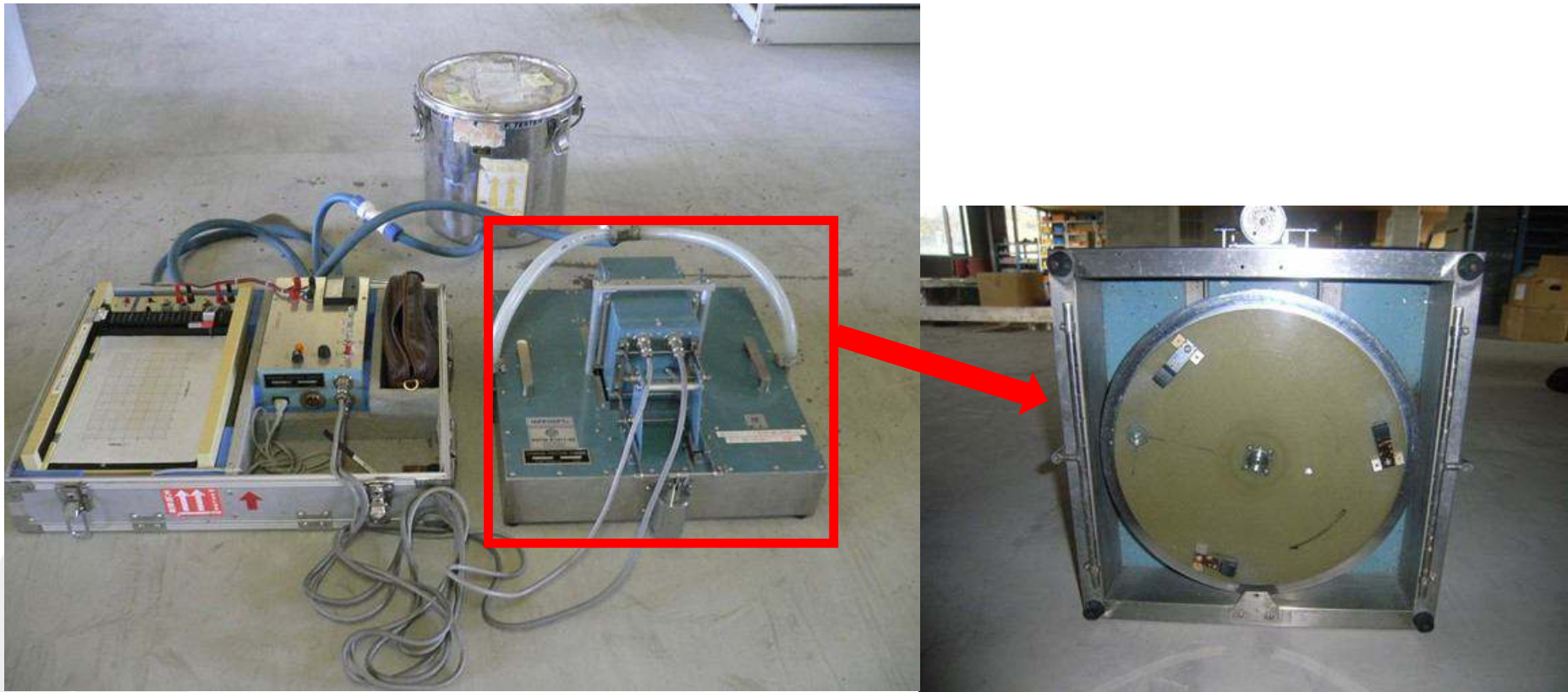
① Rubber particle diameter less than 2.5 to 1.2 mm



② Rubber particle diameter less than 1.2 to 0.6 mm

2. Properties of rubber powder

- The dynamic friction tester □ □ □ □ □ □ □ □



2. Properties of rubber powder

□ Particle diameter and skid resistance of rubber powder



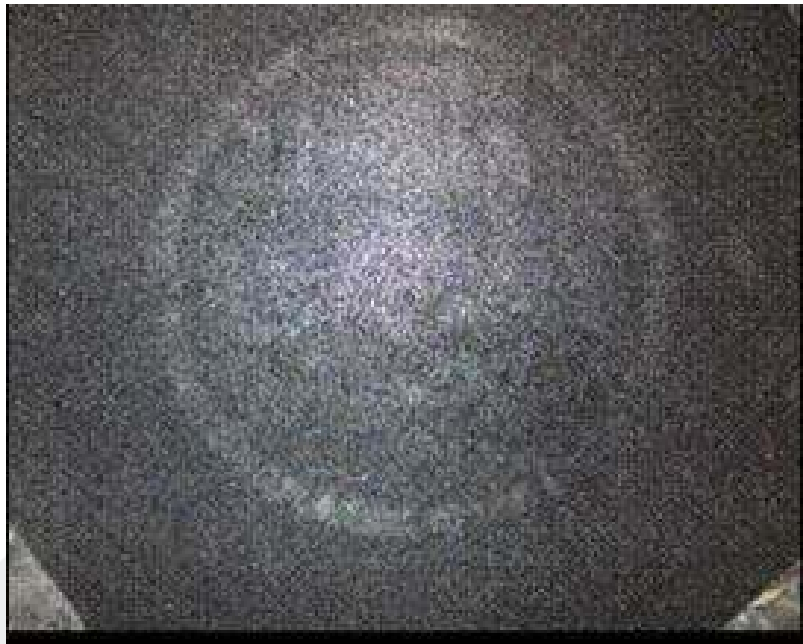
i .Rubber particle diameter less than 2.5 to 1.2 mm



ii .Rubber particle diameter less than 1.2 to 0.6 mm

2. Properties of rubber powder

□ Particle diameter and skid resistance of rubber powder



iii. Rubber particle diameter
less than 0.6 to 0.3 mm



iv. Rubber particle diameter
less than 0.3 mm

2. Properties of rubber powder

□ Particle diameter and skid resistance of rubber powder

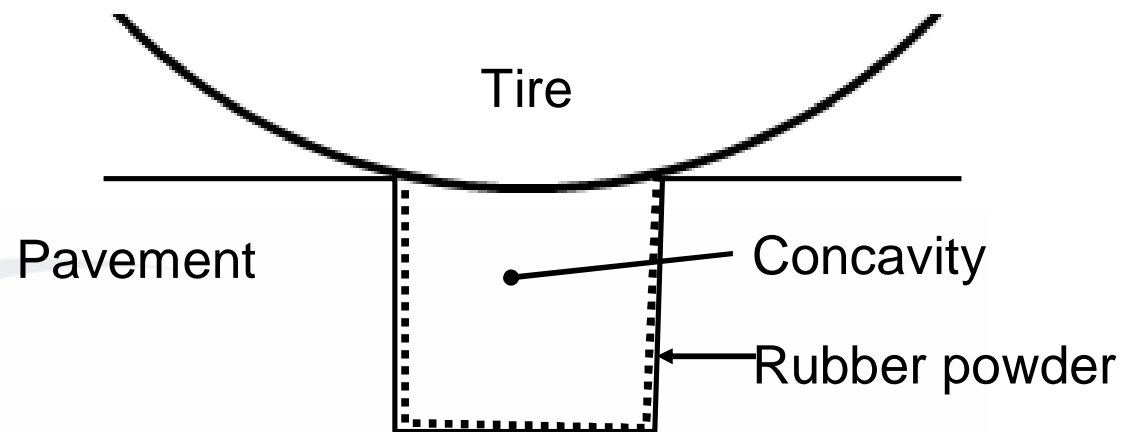
The hard rubber of the DF tester stripped off:

- i .roughly half of the rubber chips (particle diameter less than 2.5 to 1.2 mm)
- ii .roughly half of the rubber chips (particle diameter less than 1.2 to 0.6 mm)
- iii.roughly one-third of the rubber powder(particle diameter less than 0.6 to 0.3 mm), and
- iv .almost no rubber powder(particle diameter less than 0.3 mm).

3. Characteristics of the rubber-powder freezing prevention pavement, and construction methods

【Characteristic】

The rubber-powder freezing prevention pavement physically minimizes the road surface from freezing, through the adhesion of rubber powder to the concave surfaces of the pavement .



Schematic illustration of freezing prevention using rubber powder

3. Characteristics of the rubber-powder freezing prevention pavement, and construction methods

【Characteristic】

The rubber powder bonds to the concave surfaces of the pavement with a special adhesive agent, and may become detached after long service.

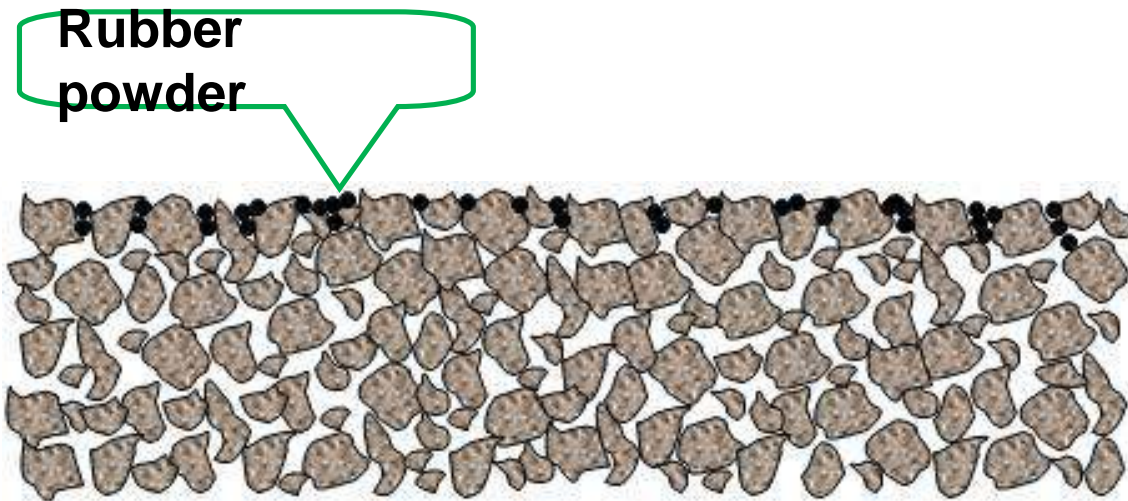


In such a case, freezing prevention may be restored by simply applying rubber powder once again.

3. Characteristics of the rubber-powder freezing prevention pavement, and construction methods

【Construction】

The rubber powder is simply applied after washing the pavement with a water jet to remove any soil and sand from the concavities and voids .

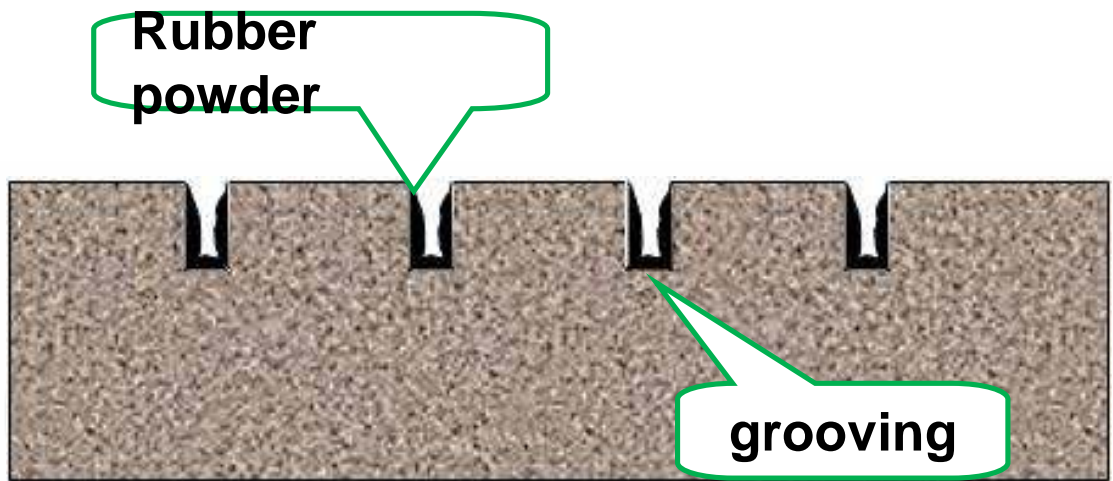


Surface of drainage pavement

3. Characteristics of the rubber-powder freezing prevention pavement, and construction methods

【Construction】

The rubber powder may have difficulty bonding with the surface; therefore, the pavement surface must first be sufficiently roughened by grooving.



Surface of dense graded pavement



4. A trial construction project using rubber-powder freezing prevention pavement

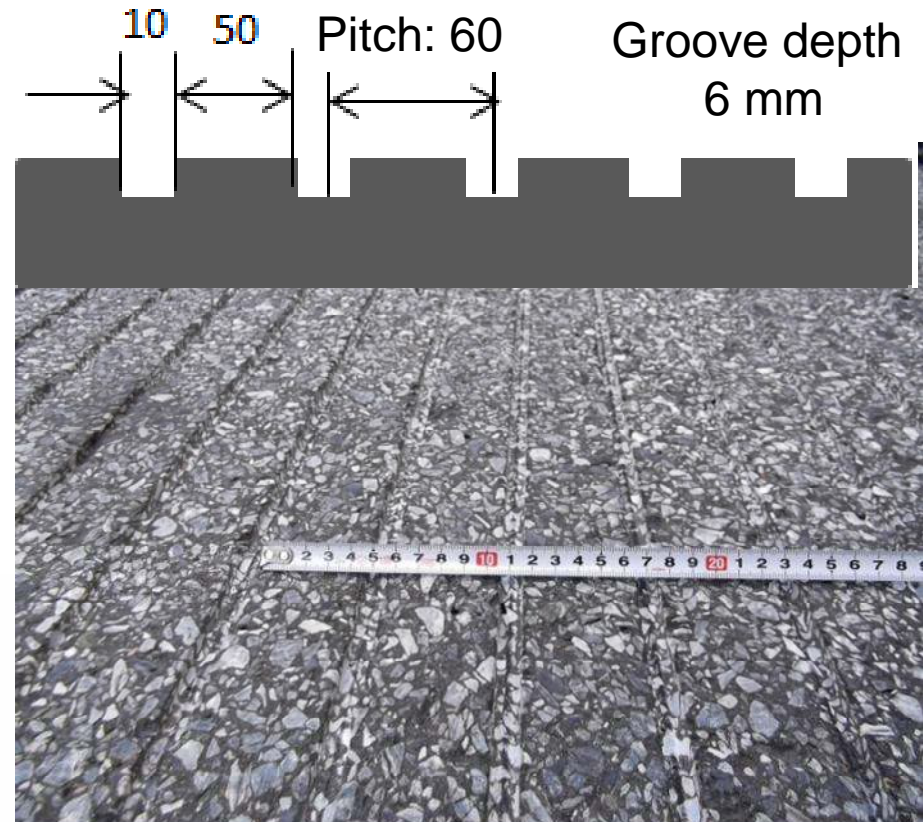
Overview of the trial construction project

Project location	Sumita-cho, Kesen-gun, Iwate
Project date	November 2012
Project scale	Width 5.0 m × Length 32.4 m = 162 m ²
Existing pavement	Dense graded asphalt concrete Longitudinal slope: roughly 10%

4. A trial construction project using rubber-powder freezing prevention pavement



1. Before construction



2. Pavement surface after grooving

4. A trial construction project using rubber-powder freezing prevention pavement



3. Cleaning the pavement



4. Applying a special adhesive agent

4. A trial construction project using rubber-powder freezing prevention pavement



5. Spreading rubber powder

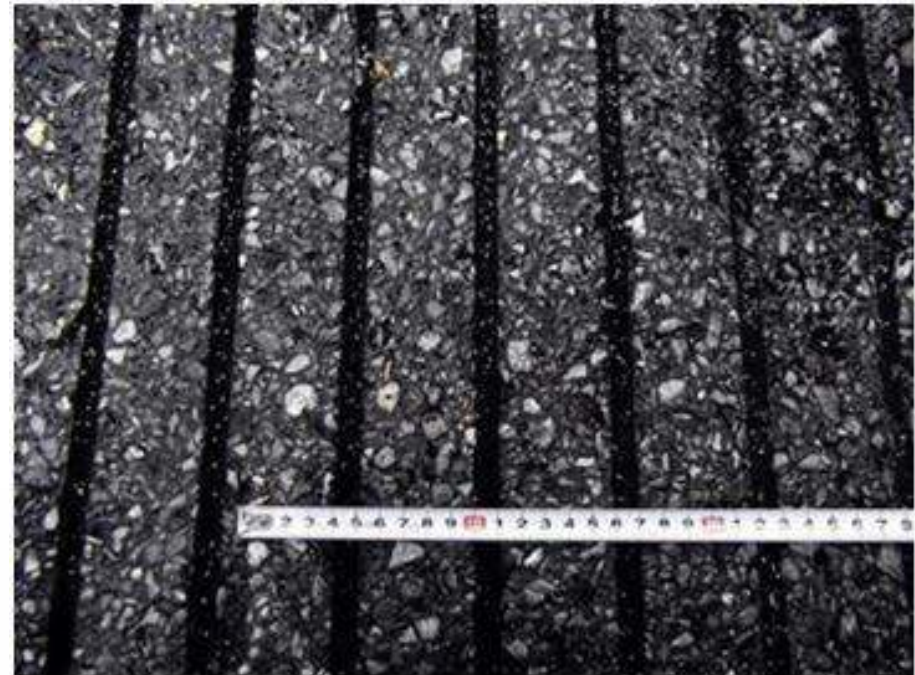


6. Removing and collecting excess rubber powder

4. A trial construction project using rubber-powder freezing prevention pavement



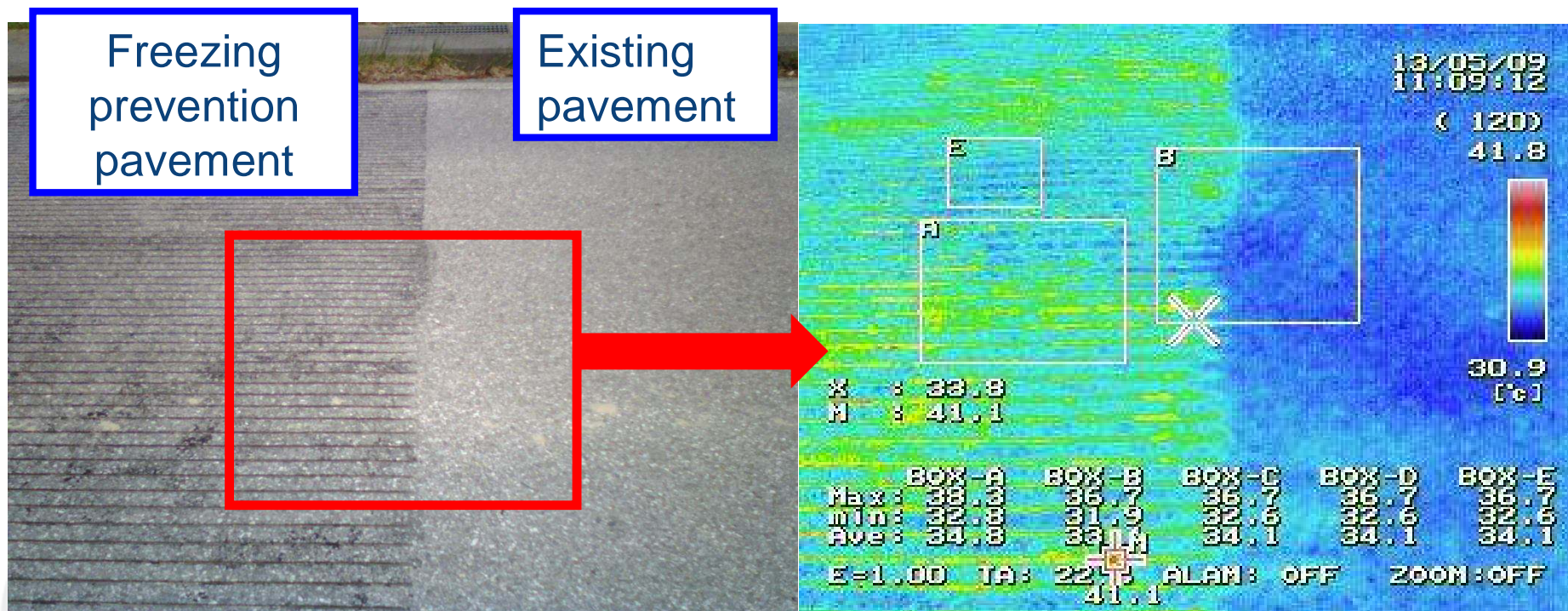
The completed pavement



Surface of the completed pavement

5. Summary of the results

【Results of the trial construction project】



With rubber powder (left)
Without rubber powder (right)

5. Summary of the results

【Results of the trial construction project】

Snow cover depth	10~20 c m
Temperature	-5°C
Time	A M 7: 50



Freezing prevention under snow cover

6. Conclusions

After the trial construction project □□□□□□

- The rubber-powder freezing prevention pavement was effective in preventing the road (dense graded asphalt + grooving) from freezing.
- The material is inexpensive, simple and easy to utilize.
- The material may be used for both new and existing pavement as long as the respective surface is sufficiently rough.

The trial pavement will be monitored to assess its durability.

Thank you for your attention.