

# Skid Resistance of Sidewalk of Residence Area in Wet, Sludgy and Snowy Conditions

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# 1. INTRODUCTION

- Pedestrians slipping and falling is a major safety problem around the world
- The study aimed to find how much the skid resistance will be decreased by weather change as like snow-melting, sludgy, and snowy conditions at different surface types as mentioned later
- The criterion for the skid resistance of curbs within sidewalk was set as 40BPN in Installation and Management Guideline of Sidewalk in South Korea
- the consistency of skid resistance along the pedestrian route is being importantly concerned at the study as well as the values of skid resistance measured at different conditions



Snow melting



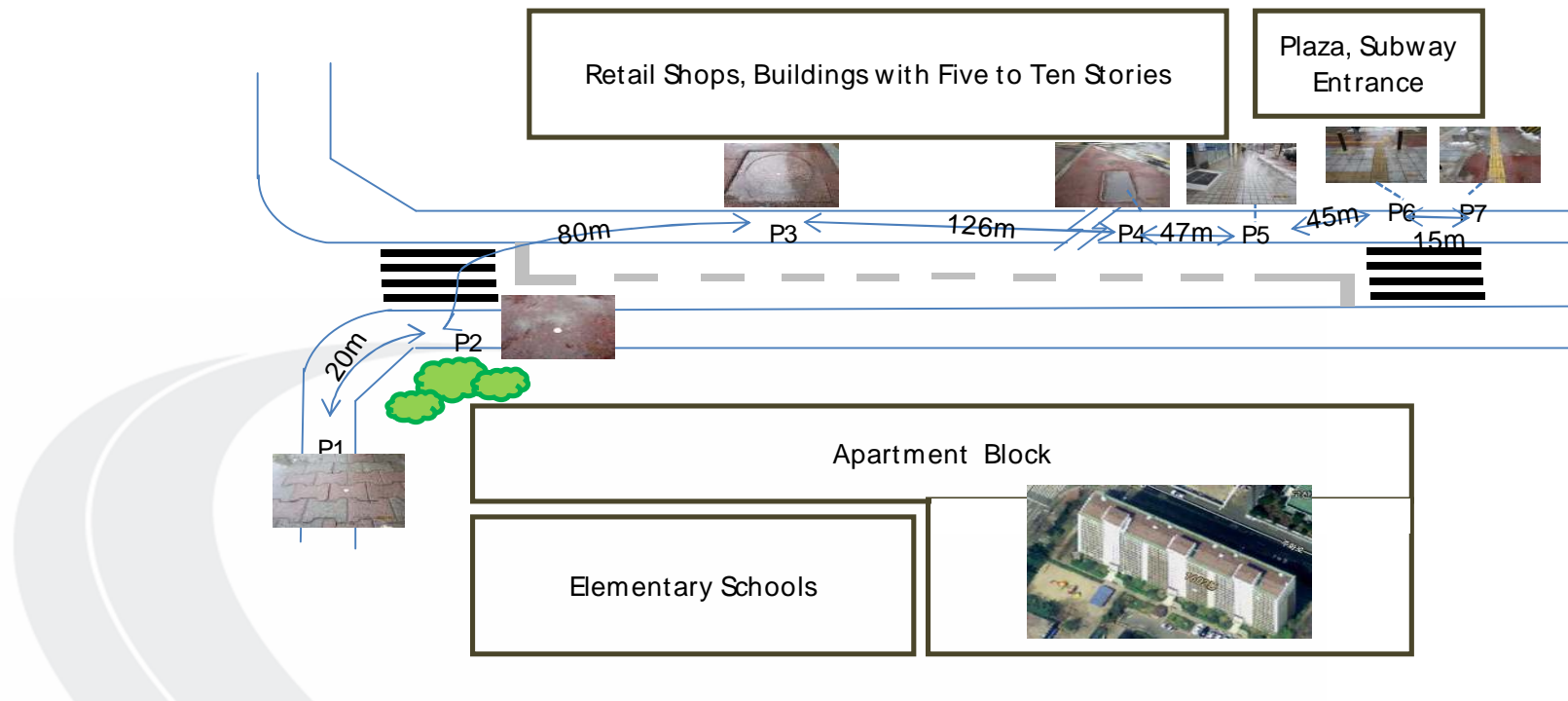
sludgy



snowy

## 2. Method : Test Site

- Measurements were made along the route mimic the walking trajectory of pedestrians at sidewalk using British Pendulum Tester, so skid resistance value itself and variation of skid resistance along the route can be analysed



## 2. Method : Surface Types

- P1: Concrete Interlocking Block
- P2: Colour Asphalt Pavement
- P3: Concrete Manhole
- P4: Steel Manhole
- P5: Granite Block Paving
- P6: Concrete Textile Paving
- P7: Plastic Textile Paving



P1



P2



P3



P4



P5



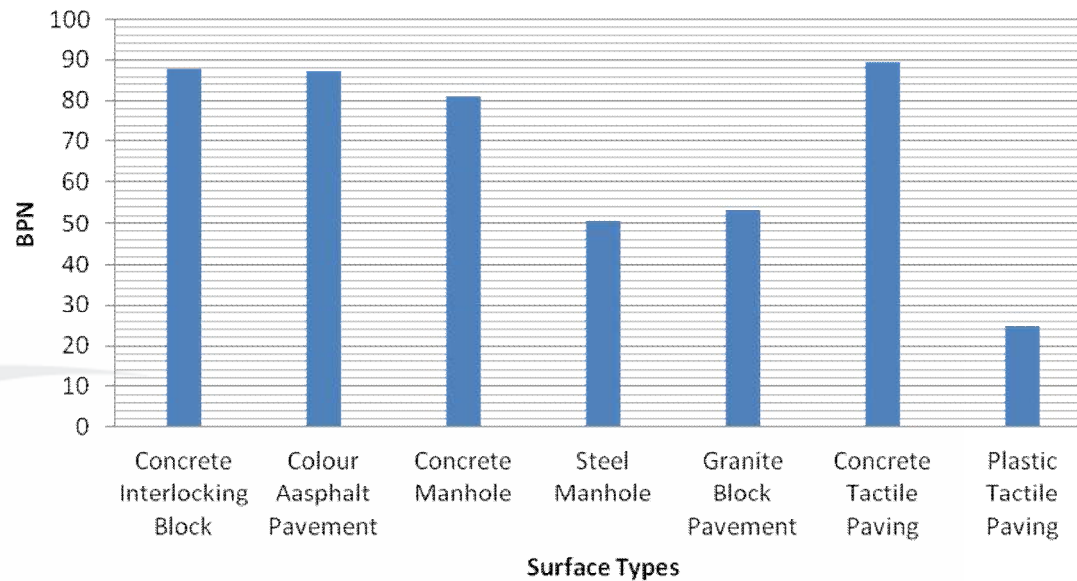
P6



P7

### 3. Result : SR by Surface Type in Snow melting

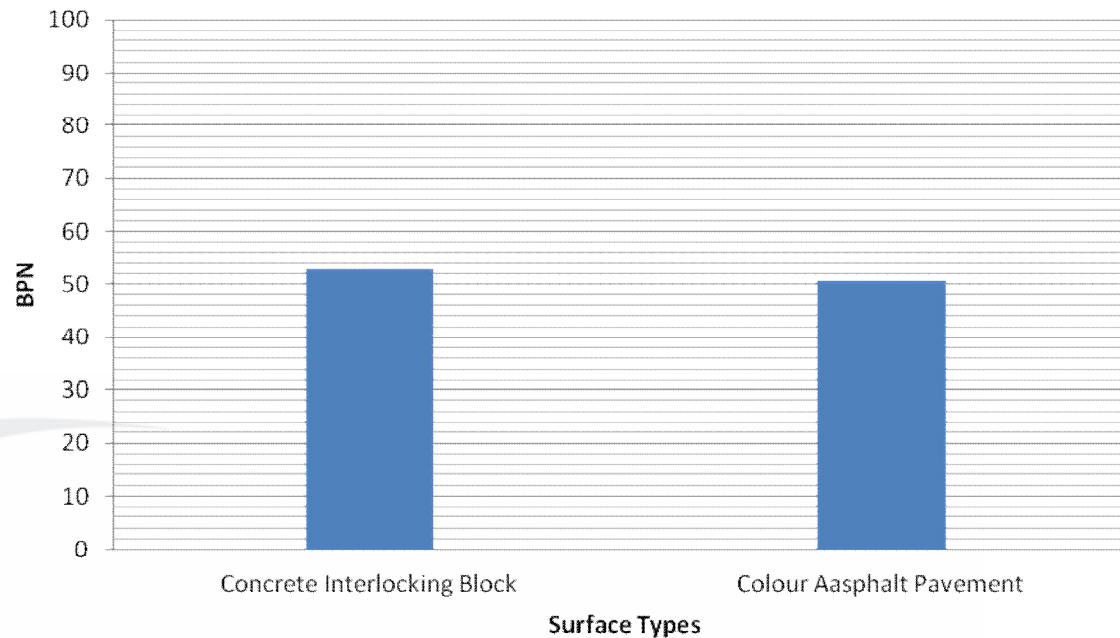
- Surface of concrete and asphalt material represented the higher values compared to the surface made of steel or plastic materials
- However, the skid resistance of plastic tactile paving is lower than the skid resistance criteria (40BPN) suggested in Sidewalk Design Guideline of South Korea



Skid resistance(SR) corresponding to surface types in snow melting

### 3. Result : SR by Surface Type in Sludgy

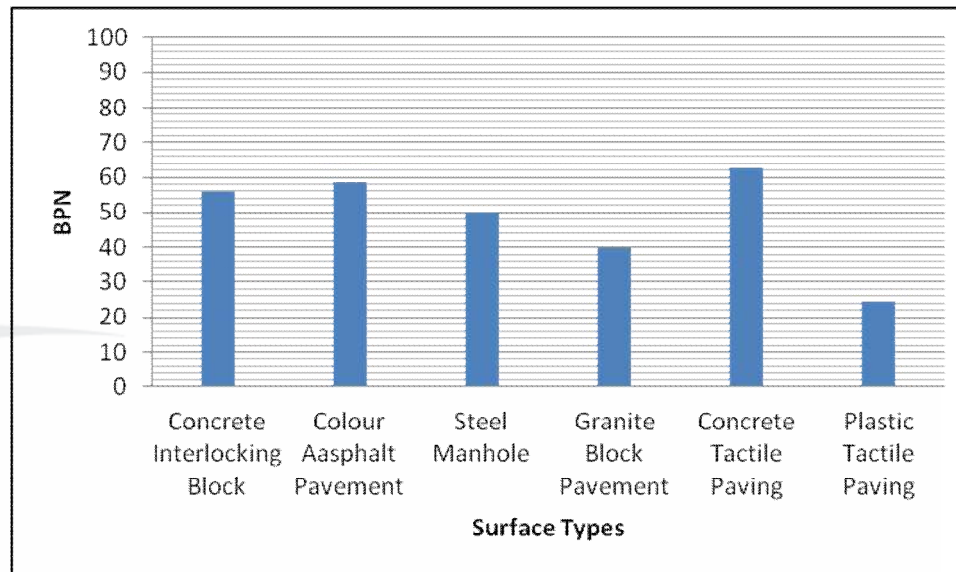
- Two cases were measured, and the values were about 50 of BPN
- Though this value is higher by 10 compared the value recommended by Guideline, the margin is not quite high



Skid Resistance(SR) corresponding to surface types  
in sludgy

### 3. Result : SR by Surface Type in Snowy

- the skid resistance across the surface types are not varied quite much except the plastic tactile paving
- skid resistance of steel manhole in snowy is not lowered compared to the snow-melting, authors expected that the rough pattern of surface of steel manhole can be partly contributed the results



Skid Resistance(SR) corresponding to surface types in snowy



### 3. Result : Reduction Rate

- interlocking block and asphalt pavement, reduction rate is around 40% in sludgy, 35% in snowy respectively
- the reduction rate of steel manhole and plastic textile paving is closed to 1%. It means that reduction of skid resistance both these surface types are not made
- Reduction Rate=  $(BPN1 - BPN2) / BPN1 * 100$   
 (BPN1=BPN in Snow-Melting, BPN2=BPN in Sludgy or Snowy)

Surface Type	Reduction Rate (%)	
	Sludgy	Snowy
Concrete Interlocking Block	40.0	36.6
Asphalt Pavement	41.9	33.2
Granite Block Pavement	N/A	25.2
Steel Manhole	N/A	0.8
Concrete Textile Paving	N/A	30.0
Plastic Textile Paving	N/A	1.6

Reduction Rate Compared to Snow-melting Condition

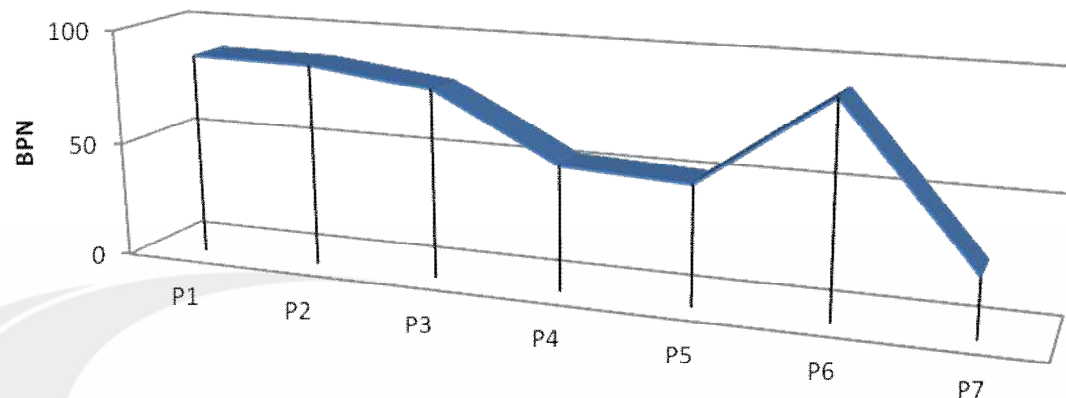
### 3. Result : Consistency of SR along Route(1)

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- Consistency of skid resistance along the pedestrian route is important, because pedestrians are not aware about the exact skid resistance of the surface they are walking on
- So, the abrupt change of skid resistance is more likely to make pedestrians falling
- As far as this study concerned, there is no internationally accepted criterion or index of consistency of skid resistance along pedestrian route
- So, The study assumed that sharp drop or jump of skid resistance between sections or points can be regarded as violating the consistency

### 3. Result : Consistency of SR along Route(2)

- At point 4 with steel manhole, skid resistance is rapidly decreased to 50.6 from 81.0 at point 3 (concrete manhole), so the consistency is violated at transition from P3 to P4 and P5 where granite block paving is existed
- Skid resistance is decreased to 24.8 at P7 which is few meters distanced from P6 where the skid resistance is 89.4, so consistency is again violated from P6 to P7



- P1: Concrete Interlocking Block
- P2: Colour Asphalt Pavement
- P3: Concrete Manhole
- P4: Steel Manhole
- P5: Granite Block Paving
- P6: Concrete Textile Paving
- P7: Plastic Textile Paving

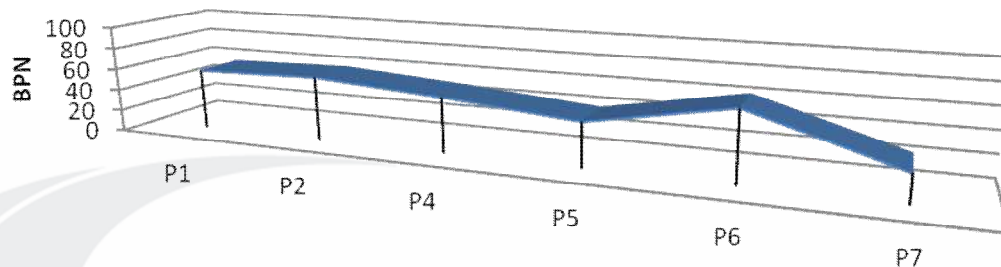
Skid Resistance Measurement Points

Skid Resistance Corresponding to Surface Types  
in Snow-melting

### 3. Result : Consistency of SR along Route(2)

■At P5 with granite block paving, skid resistance is dropped to 39.8 from 50.2 at point 4(steel manhole), so the consistency is said to be violated at transition from P4 to P5

■pedestrians have a concrete tactile paving at P6 where skid resistance is relatively high as much as 62.6, so consistency is said to be violated from P5 to P6. Skid resistance is decreased to 24.4 at P7, so consistency is said to be violated from P6 to P7



Skid Resistance Variation along Measurement Sites

- P1: Concrete Interlocking Block
- P2: Colour Asphalt Pavement
- P3: Concrete Manhole(not measured)
- P4: Steel Manhole
- P5: Granite Block Paving
- P6: Concrete Textile Paving
- P7: Plastic Textile Paving

Skid Resistance Corresponding to Surface Types  
in Snowy

## 4. Conclusion

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- skid resistance is varied depending on the paving materials and weather conditions
- the appropriate level of consistency of skid resistance should be controlled along the pedestrian route
- a careful consideration should be made in placing manhole and paving for vision impaired not to lose the consistency along the pedestrian route
- more detail study on the skid resistance of the manhole and textile paving which have a rough pattern on surface is recommended
- Internationally accepted index for the consistency of skid resistance along the pedestrian route needs to be studied

THANK  
YOU