

# Full Function Pave (FFP)

## Longitudinally grooved, coarse-surface hybrid paving

تعبيد الطرق المتكامل الوظائف (FFP)  
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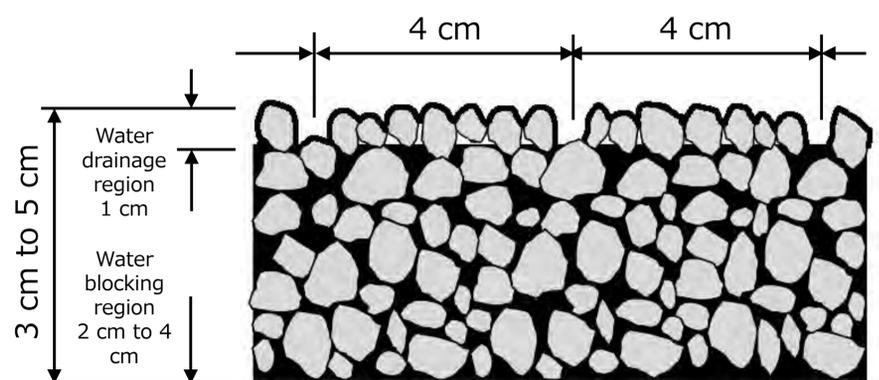
### Overview

“Full Function Pave” is a longitudinally grooved coarse-surface hybrid paving, consisting of a single-layer paving structure where the surface region provides water drainage and the lower region provides water blocking functionality. An asphalt finisher system equipped with an improved compactor works the pavement to a longitudinally-grooved coarse finish, which contributes to greater driving safety during rain and other adverse weather conditions, freezing and noise reduction, and visibility improvement. FFP paving also has a data-proven effect of traffic accident reduction.

### An example of longitudinally grooved coarse finish



### Full Function Pave layer structure



### Full Function Pave composition property test criteria

Item	Internal criterion
Cantabro loss rate (-20°C)* <sup>1</sup> (%)	12 or less
Water permeability coefficient* <sup>2</sup> (cm/sec)	$1.0 \times 10^{-7}$ or less
Dynamic stability (DS) (cycles/mm)	6,000 or over

\*<sup>1</sup> Cold climate condition; use 20°C for common climate locations.  
\*<sup>2</sup> Based on pressurized permeation test result.

### Full Function Pave road surface property criteria

Item	Internal criterion
Road surface texture fineness (MPD) (mm)	1.2 or finer
Water seepage rate (ml/15 sec)	800 or over* <sup>1</sup>
Skid resistance (BPN) (BPN <sub>20</sub> ) * <sup>2</sup>	60 or over
Skid resistance (DF tester) (μ)	0.25 or over

\*<sup>1</sup> Equivalent to the water seepage rate of a water-draining pavement with a void rate of 17%.  
\*<sup>2</sup> As converted to 20°C road surface BPN

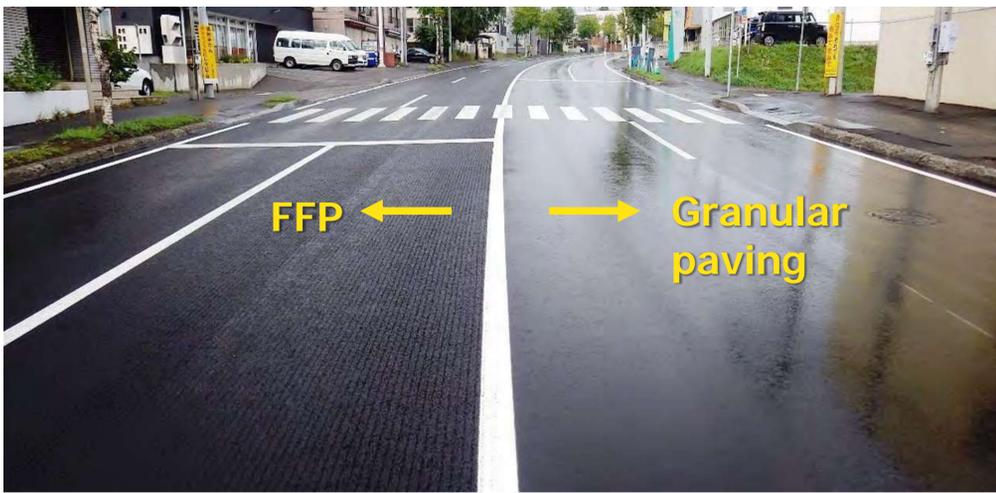


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## Features

- ◆ The single top layer provides both water drainage and water blocking functionality
- ◆ Hydroplaning reduction and other safety improvement benefits
- ◆ Visibility improvement and road noise reduction achieved by the longitudinally grooved coarse surface
- ◆ Longitudinally grooved coarse finish also contributes to a longer-lasting anti-freezing effect
- ◆ Longer pavement life due to resistance to aggregate scattering
- ◆ Skidding minimization as part of traffic accident reduction measures

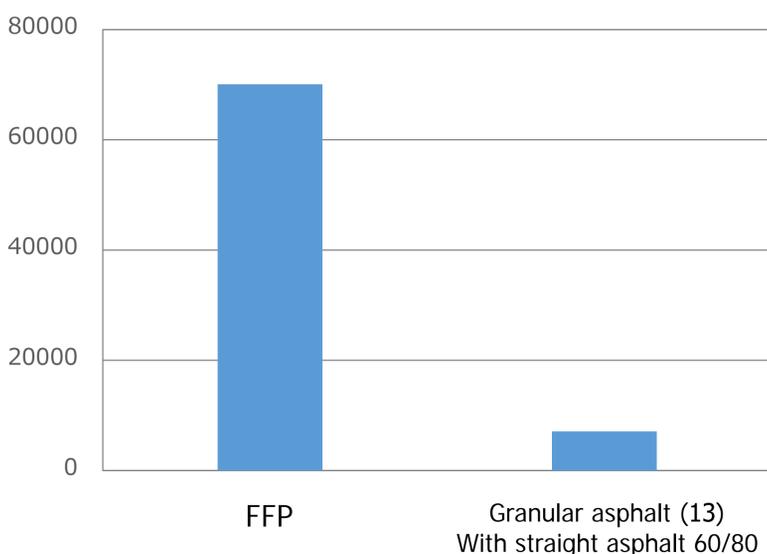
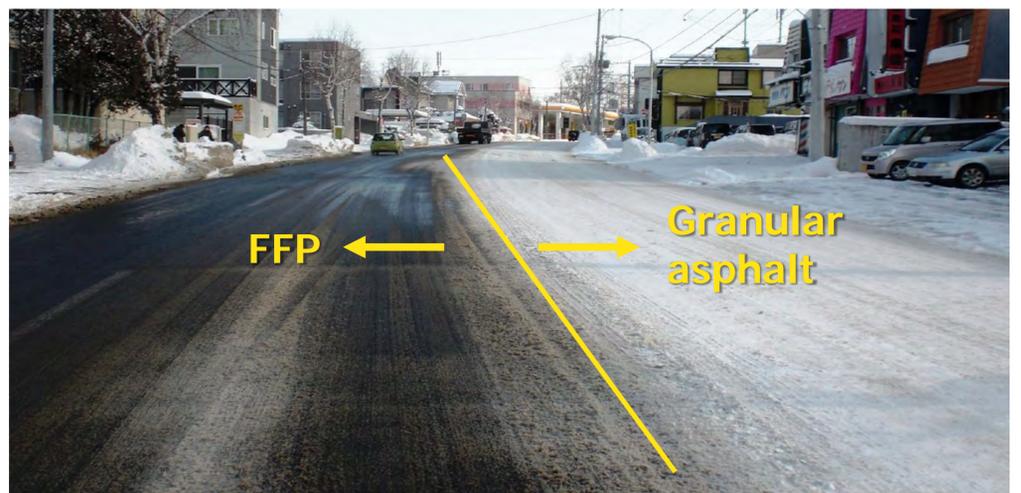


## Water drainage

The surface region of the Full Function Pave layer has water drainage functionality which reduces floating water on the road surface during rain and other wet conditions. Such floating water reduction helps minimize hydroplaning and water spraying ("smoking") effects, contributing to greater driving safety during rainfall. Floating water reduction also reduces freezing in wintertime and thus helps prevent "black ice" from forming on the road.

## Freezing reduction

Longitudinally grooved coarse road surface, a main feature of the Full Function Pave, retains antifreezing agent well, contributing to good salt retention and thus a longer-lasting antifreezing effect. Such greater salt retention makes the road surface more quickly exposable compared to ordinarily paved roads. In addition, the smaller amount of salt loss to outside the road boundary allows winter road networks to be maintained with a fewer number of antifreezer applications.



## Fatigue destruction test results

Shown in the diagram is a fatigue destruction test result where the specimen was loaded at a single point with both ends supported. Comparison of fatigue resistance between Full Function Pave and granular asphalt composition shows that Full Function Pave has approximately ten times as much resistance of a straight asphalt 60/80 binder composition and also twice as much fatigue resistance as that of Type II polymer improved asphalt.



# High strength PRC panel

## Precast reinforced concrete paving panel

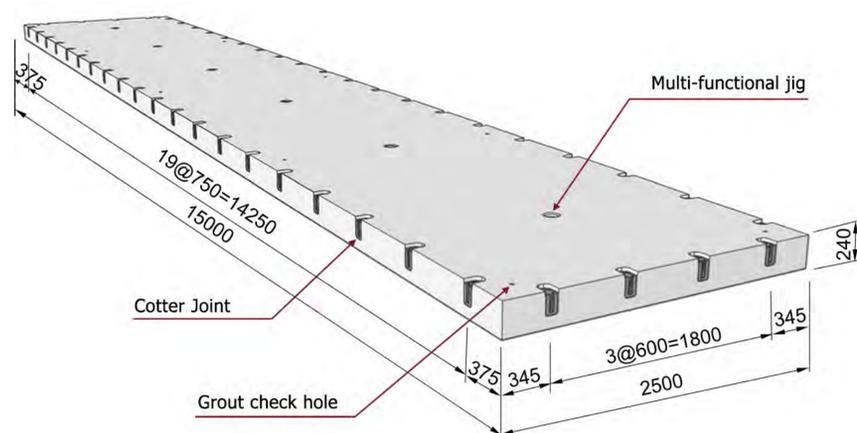
ألواح تعبيد ذات مقاومة عالية مصنوعة من خرسانة PRC  
ألواح تعبيد مصنوعة من الخرسانة المسلحة المسبقة الصب



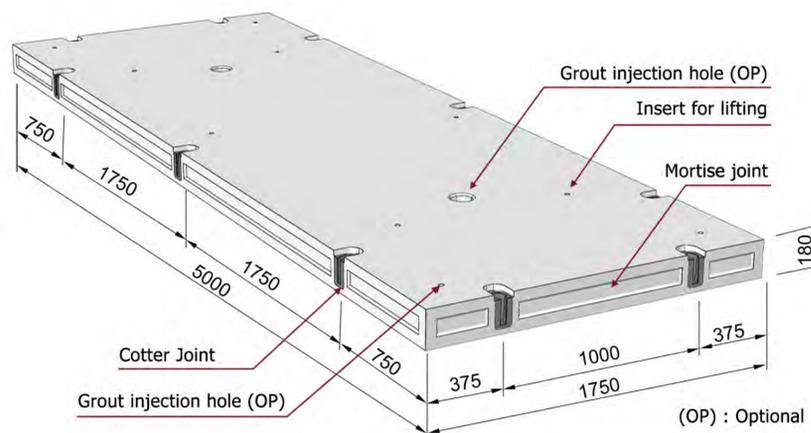
### Use of precast paving panels reduces work time

The high-strength PRC panel is a paving precast (factory-fabricated) concrete component with long life, high quality and greater durability, making the pavement suitable for heavy loading applications such as airports, container yards, and busy highways and soft and weak ground conditions and also significantly reducing work time and the lifecycle cost of the road.

### Appearance

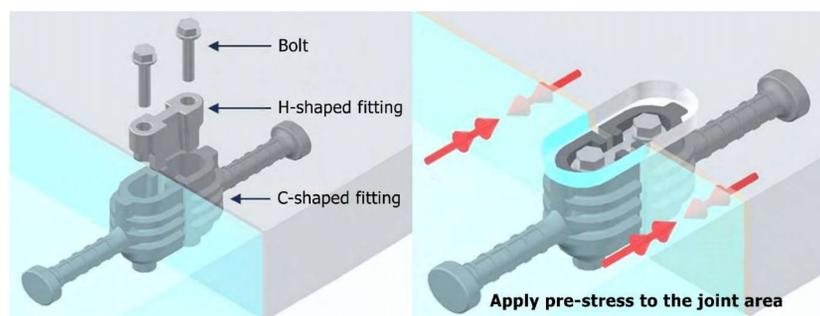


High-strength PRC panel (airport loading type)



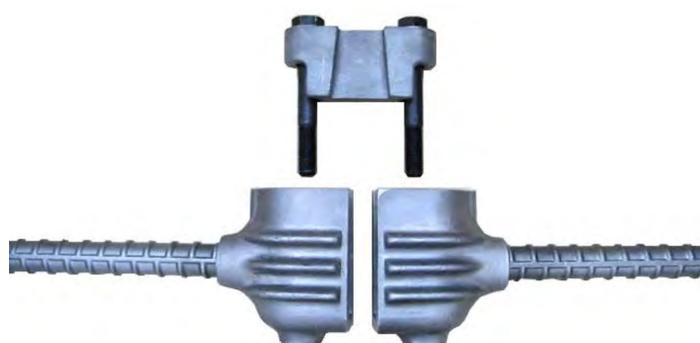
PRC panel for general road applications

### Features



Panel connection with a cotter joint

- ◆ Uses high-strength concrete composition (with design criterion strength of 60 N/mm<sup>2</sup>).
- ◆ Adoption of the lattice truss steel reinforcement structure contributes to greater displacement conformability, wall thickness reduction and weight cut.
- ◆ Inter-panel connection with cotter joints realizes a fully flat joint and facilitates partial replacement of panels.



Cotter joint



Reinforcement basket

Lattice truss reinforcement



# High strength PRC panel

## Precast reinforced concrete paving panel

### ألواح تعبيد ذات مقاومة عالية مصنوعة من خرسانة PRC

### ألواح تعبيد مصنوعة من الخرسانة المسلحة المسبقة الصب

#### Applications of high-strength PRC panels



#### Road pavement

Heavy traffic roads, intersections, tunnels, underpass locations, highway toll gates, SA and PA parking lots



#### Airport pavement

New installation and repairs of aprons and taxiways



#### Seaport pavement

Crane paths, container panels

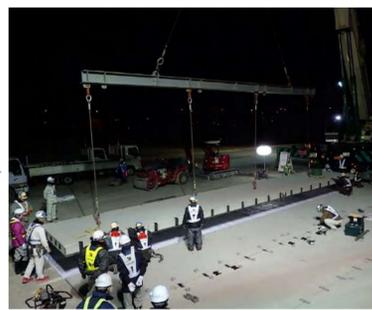
#### Installation steps



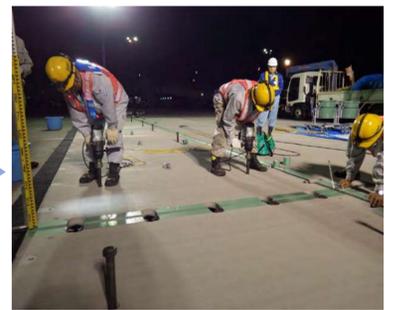
Remove existing road base



Lay soft plastic sheet



Position high strength PRC panels



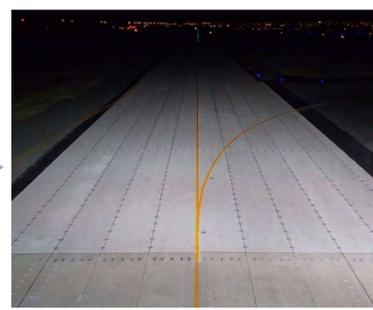
Adjust height



Inject grout



Clamp cotter joints



Completed

#### Application examples

The high-strength PRC panels have been installed in airports, seaports and road networks around the nation where a prolonged service suspension is difficult to accommodate.



Speedy installation within limited timeframe (airport taxiway)



Installation at a seaport pier site



Installation with nighttime lane restriction (heavy traffic road)



Rutting reduction in large-vehicle parking lots at a highway PA

