Chapter 2: Types of Repair Methods I: Maintenance Methods

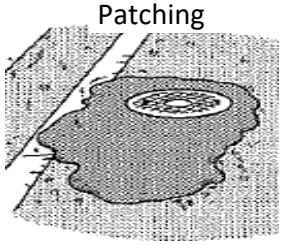
The maintenance method does not seek to fundamentally repair the damage to the pavement, but only seeks to maintain the serviceability of the pavement.

2.1 Patching Method

This is a method of emergency filling of potholes, steps, partial cracks and dents with an asphalt mixture.

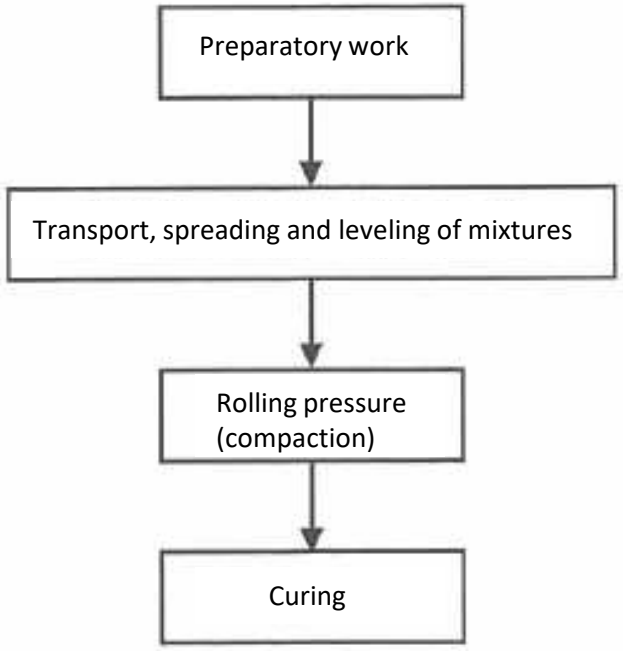
There are two types of methods: a very simple, temporary method where the damaged area is buried directly in the asphalt mixture without prior treatment, or a method where the defective part is removed by a cutter and then backfilled with asphalt mixture.

The patching method includes a heating mixing method and an ambient temperature mixing method.


Patching

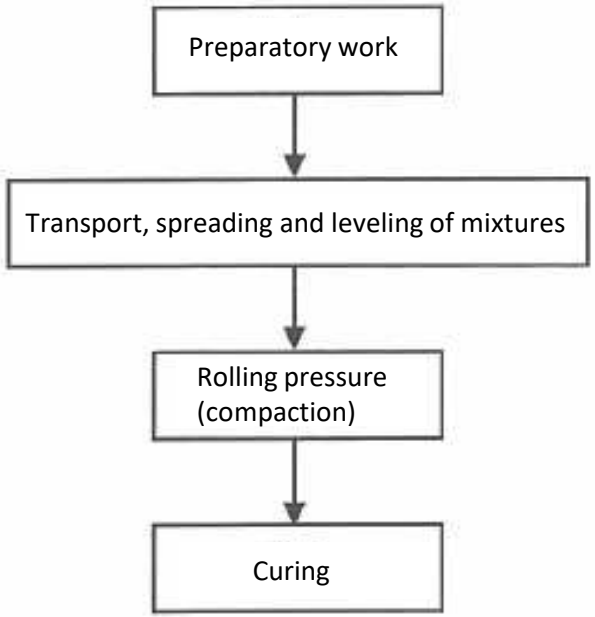
2.1.1 Heating construction method

It is a construction method in which a heated asphalt mixture is urgently filled in potholes, steps and dents. Suitable for repairing roads with heavy traffic.



2.1.2 Ambient temperature construction method

Materials can be stored and handled easily. It is used for light traffic roads and emergency situations.



Clean area to be repaired

Input required amount

Sprinkle water

Put pressure

◆ Overview of "Step Correction Material"

It is a road repair material that can be easily constructed, is highly durable, and can be applied to step repair of roads and refresh of rough road surfaces because of its good adhesion to existing pavements.

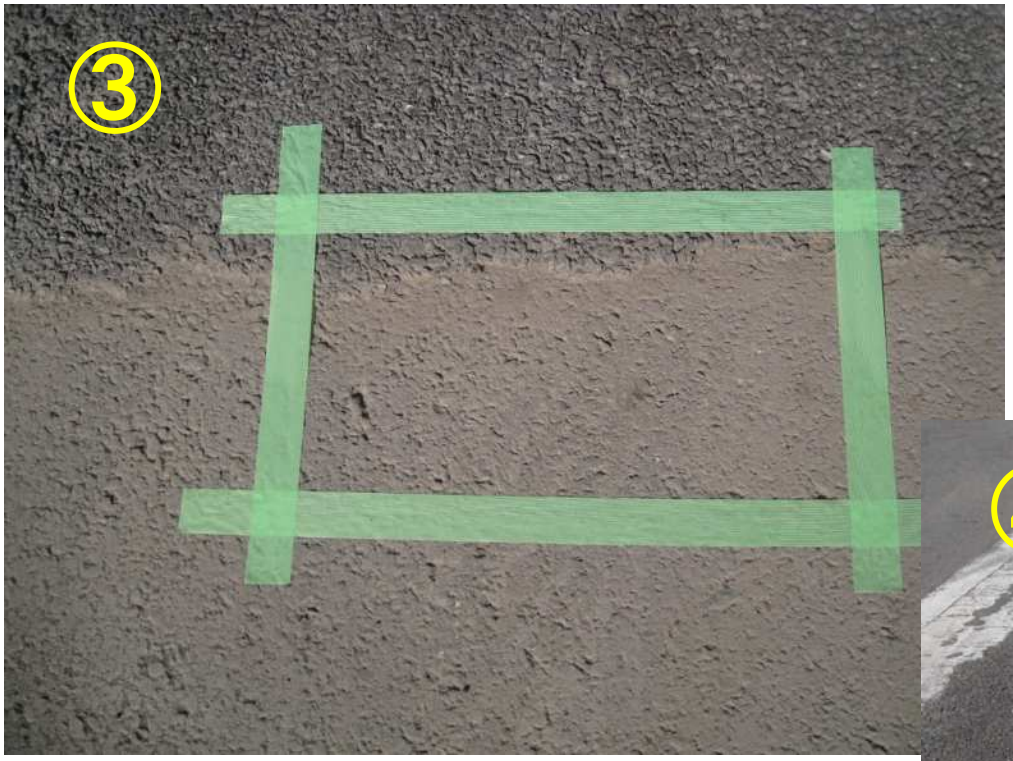
◆ Construction Method (1)

- 4 sets / box
- 1 set: powder 4kg and resin 0.8kg

Approximately: 2 ✔ /set

- Removes debris etc. to ensure adhesion to existing pavement.

◆ Construction Method (2)



- Cure the area around the construction site so that it does not get dirty.

- Open the bag and put the resin in the powder.

◆ Construction Method (3)

- Knead well by hand so that the ingredients are mixed even.

- An appropriate amount is poured onto the road surface according to the thickness of the application.

◆ Construction Methods (4)

- Completed
- The color is blue immediately after installation, but it turns black as time passes.

- Make the surface even with a trowel.
- Do it quickly especially in summer.

Construction Example

- Home door installation

For repairing parts where construction time is limited

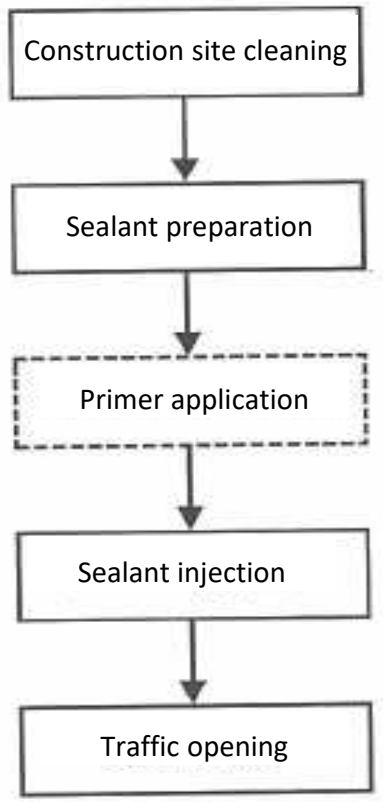
2.2 Sealant injection method

It is a method of filling asphalt-based sealing materials such as crack sealing materials, asphalt mortar, slurry mixtures, blown asphalt, joint-sealing compound, and room temperature resin-based sealing materials such as epoxy, MMA resins, etc., after pre-processing such as cleaning and drying of cracks to be repaired.

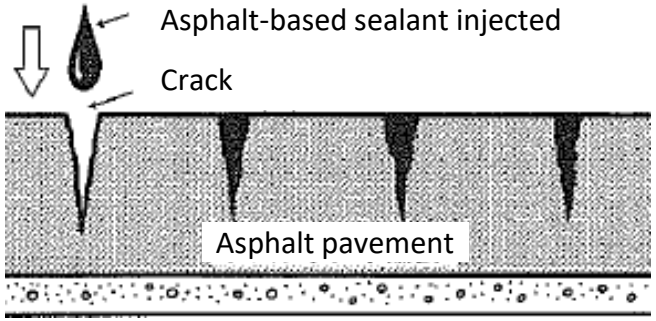
2.2.1 Asphalt-based sealant injection method

A method of repairing by injecting a heat injection type sealant consisting of asphalt, rubber, etc.

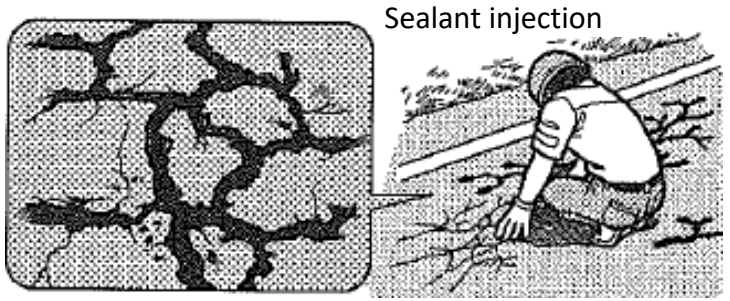
It is applied to cracks that are relatively wide (5-10 mm).



No flow and runoff at high temperatures and no embrittlement and hardening failure at low temperatures, and adhesion is high.
Because it is excellent in elasticity, it adapts well to expansion and contraction.



2.2.2 Room-temperature-resin-based sealant injection method



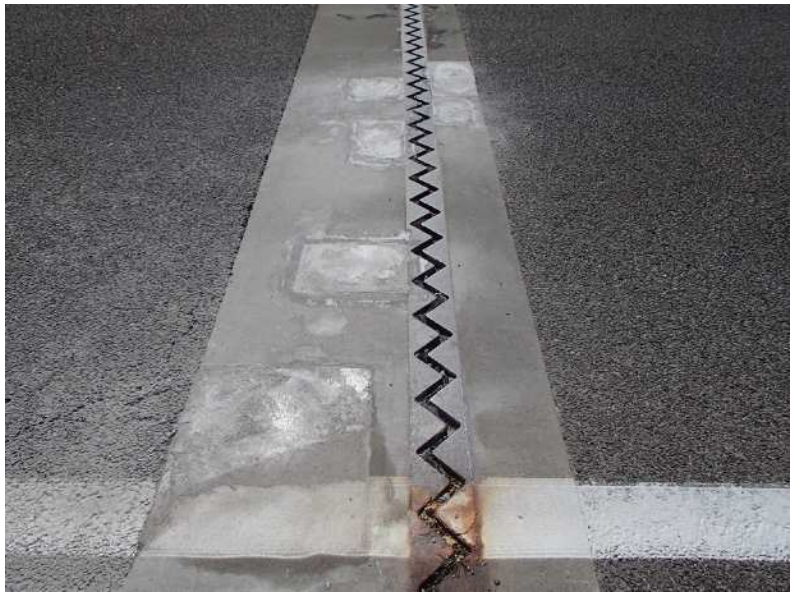
Method of repairing by injecting a resin-based sealant of room temperature curing type
In general, it hardens quickly, cures at low temperatures, and is flexible and easy to follow the cracks, making it easy to work with and quick to install.
Can be applied to narrow cracks (5mm or less).

2.2.3 Room temperature concrete repair material

Premix type super fast hardening concrete repair material

When mixed with water, it hardens in 10 minutes (at 20℃) and develops the 28-day strength of normal concrete in 1 to 2 hours.

Bridge repair



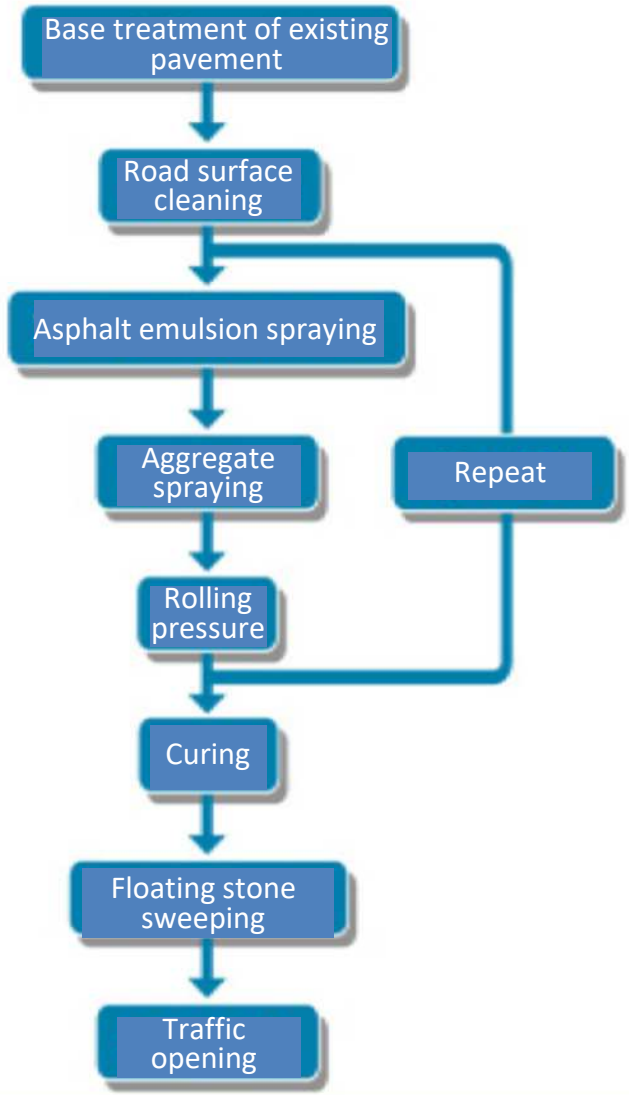
2.3 Surface treatment method

A method to provide a thin sealing layer (2.5cm or less) to the damaged road surface

2.3.1 Seal coat and armor coat

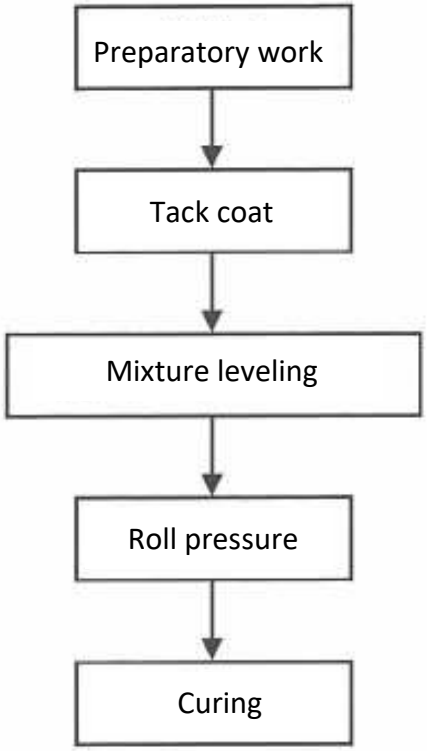
A seal coat is a thin layer surface treatment method that covers bituminous materials (asphalt emulsion, cutback asphalt, straight asphalt) sprayed thinly and evenly on the pavement surface with aggregate in order to have water resistance and abrasion resistance.

The armor coat is a construction method in which two or more layers of seal coats are stacked, and is used when a thick sealing layer is required according to the aging degree of the existing road surface, traffic volume, and the like.


Base treatment of existing pavement
Road surface cleaning
Asphalt emulsion spraying
Aggregate spraying
Repeat
Rolling pressure
Curing
Floating stone sweeping
Traffic opening

— Construction status by simultaneous emulsion and aggregate sprayer —

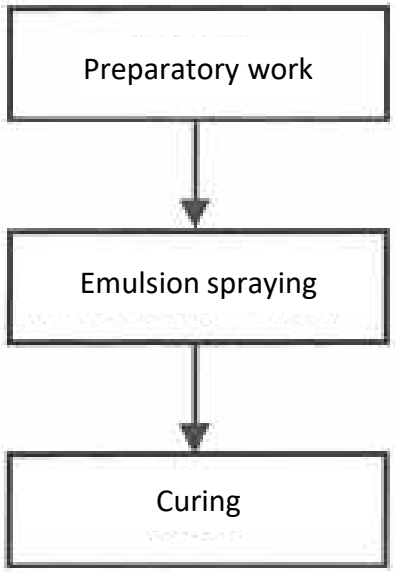
2.3.2 Carpet coat



Construction flow

A method of laying a heated mixture on the existing pavement and compacting it into a thin layer with a thickness of 1.5 to 2.5 cm.
The feature is that traffic can be released relatively early after paving.
Compared to the overlay repair method, there is no particular difference in pavement work, but the thickness can be reduced.

2.3.3 Fog seal



Construction flow

A method of rejuvenating the road surface by spraying a thin layer of asphalt emulsion diluted with water to fill small cracks and surface voids.
It is effective when used in places with low traffic.
If you are in a hurry to release traffic, sprinkle sand over the sprayed emulsion.
Emulsion: 0.5-0.8kg / ㎡ Sand: 0.2-0.3m3 / ㎡

Fog Seal Method

- Asphalt emulsion diluted with water is sprayed on the road surface.
- The material is filled into fine cracks etc. to "rejuvenate."

Before treatment construction

After treatment construction

2.3.4 Resin-based surface treatment method

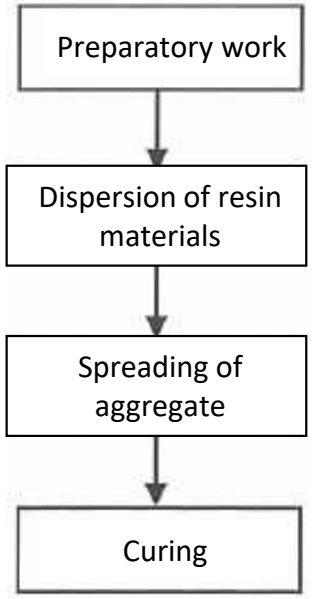
Quality standards for resin-based binders

項目	品質規格（EPN）
密度	1.00 ～ 1.30
ポットライフ（可使時間）	10 ～ 40 分
半硬化時間	6 時間以内
引張強さ	材齢 3 日：材齢 7 日の 70%以上 材齢 7 日：6.0N/mm^2 以上
伸び率	20%以上
塗膜収縮性	7mm 以下

Epoxy resin or the like is sprayed or applied to the pavement, and hard aggregate is sprayed and fixed on the surface. In particular, it is a construction method that is expected to have an anti-slip effect. This method is applied as a traffic accident prevention measure by using colored aggregate to make colored pavement or using aggregate that shines with car lights at night.

Quality Standards for Hard Aggregates

種類	エメリー	着色磁器質骨材	炭化珪素質骨材	試験法など
粒径サイズ（mm）	3.5 ～ 1.5	3.3 ～ 2.0 2.0 ～ 1.0 1.0 ～ 0.5	3.5 ～ 2.0 2.0 ～ 1.0	
色相	黒	黄，赤褐色，緑，青，白	黒（光輝性）	
表乾密度	3.10 ～ 3.50	2.25 ～ 2.70	3.0 ～ 3.3	JIS A 1109 JIS A 1110
吸水率（%）	2.0 以下	2.0 以下	2.0 以下	
すりへり減量（%）	15 以下	20 以下	測定不能	JIS A 1121
粒度	規定の粒径範囲の上限を超えるものが5%以内，下限を下回るものが10%以内			JIS A 1102



Construction Flow

Coating of resin materials

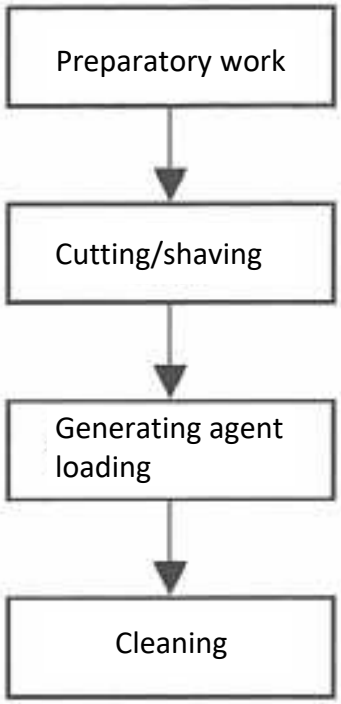
Spraying of aggregate

2.4 Other methods

2.4.1 Shaving method

A construction method that restores road surface properties by mechanically scraping off the convex parts when unevenness or steps occur on the pavement surface

When traffic is released on the cutting surface, the noise caused by vehicles running increases. When this method is applied to the deteriorated pavement, rainwater stays on the roughened pavement surface, which promotes peeling fracture.



Construction flow

Cutting status by road surface cutting machine

Status of generating agent loading

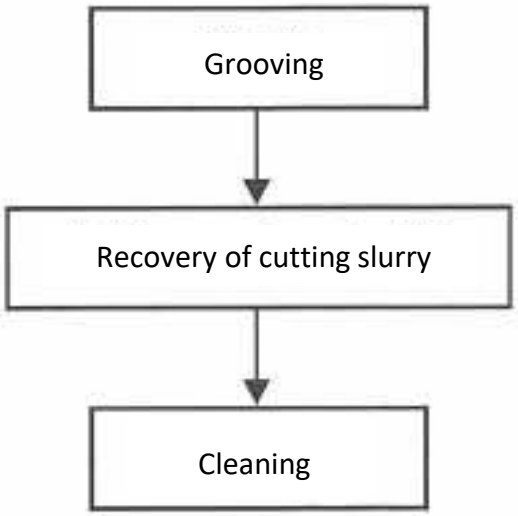
Status of road cleaning

2.4.2 Grooving method

A method to improve slip resistance by cutting the shallow grooves of a certain shape at equal intervals on the pavement surface

Since the road surface drainage property during rainfall is improved, an increase in the road surface friction coefficient in a wet state can be expected. It is also used to call attention due to changes in vibration and running noise, to guide the line of sight, and to suppress freezing.

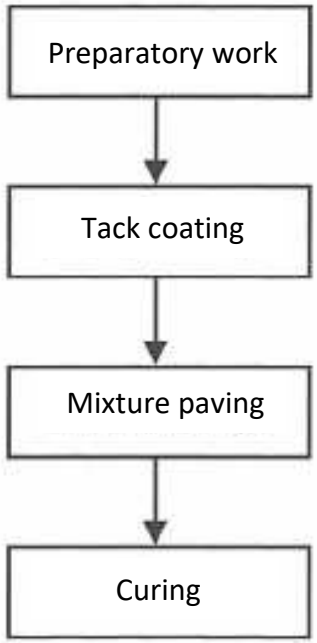
If grooving is performed on the paved road surface immediately after construction, the groove may be crushed early due to cornering or flow, so it is better to perform grooving on the road surface where traffic has been released for a certain period of time from pavement.



Construction flow

2.4.3 Rutting overlay method

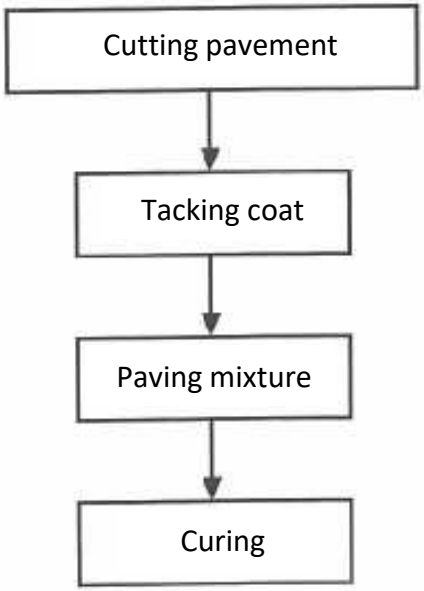
A construction method that overlays only the rutting part of the road surface, and is also called the rail-pulling method. This is mainly used for wear ruts in snowy and cold regions, and is not suitable for fluid ruts.
It is often performed as an overlay pre-processing leveling work.
The material used is a mixture with a lot of filler in snowy and cold regions.



Construction flow

2.4.4 Linear replacement method

A construction method in which the pavement is replaced along the cracks that occur linearly. This applies only to the asphalt mixture layer including the bitumen-stabilizing layer.
A general heated asphalt mixture is used for the surface layer, the base layer and the bitumen-stabilizing layer, but a modified asphalt mixture may be used for the surface layer when durability is required.



Construction flow

2.4.5 Measures against blistering

If blistering occurs immediately after the waterproof material is applied, no special treatment is required if the diameter is about 10 cm or less, but if the swelling is larger than that, take out the inside air by making a hole, press and weld the part with a burner.
If blistering occurs after pavement, make a hole from the upper surface of the pavement with a drill or the like to create an escape route for the air inside, and fill the hole with an injection material to prevent water from entering. After that, warm the pavement and slowly roll out the bulging part.