

Tunnels

The long, thin chain of islands that compose Japan has a spine of steep mountains running north to south down the island chain. The elevations reach 2,000m to 3,000m above sea level and about 70% of the land is mountainous.

Therefore, roads must be constructed on the narrow strips of land between steep slopes and the sea, alongside rivers winding between mountains, and sometimes through mountains.

Tunnels are increasingly used when constructing roads in highly populated areas due to the shortage of land and to protect the environment.

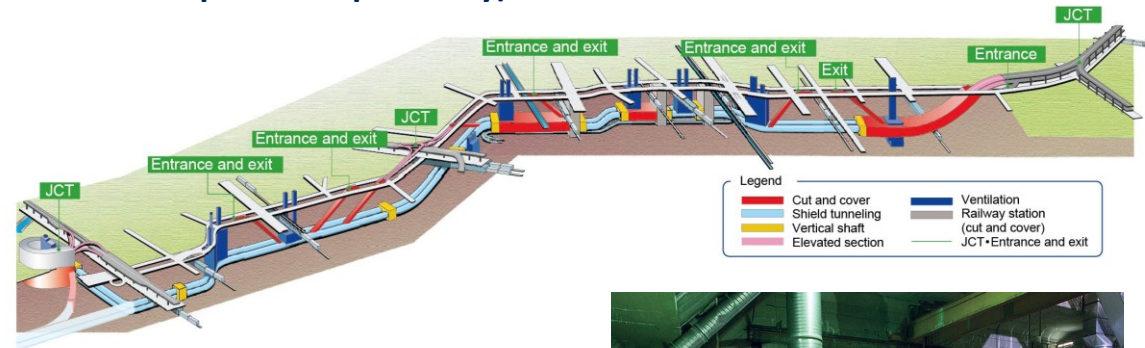
Kan-etsu tunnel

(Kan-etsu Expressway)



Yamate tunnel

(Central Circular Oi~Ikebukuro Route of the Metropolitan Expressway)



Yamate Tunnel (Shinjuku Route) Map



Bridges

Japan consists of four major islands, Hokkaido, Honshu, Kyushu, along with Shikoku, and a number of smaller islands.

Straits and inland seas hinder traffic between the islands. For well-balanced development, transportation access is required, so bridges connecting islands have been constructed.

Also, since Japan is highly prone to earthquakes, typhoons and strong winds, cutting-edge technologies are used to construct and maintain long-span bridges that can withstand severe weather and natural disasters.

Honshu-Shikoku expressway



Akashi Kaikyo Bridge



Tatara Bridge

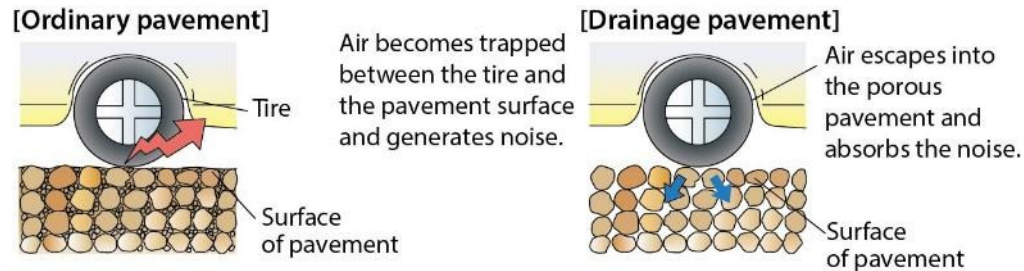
Tokyo bay aqua-line expressway



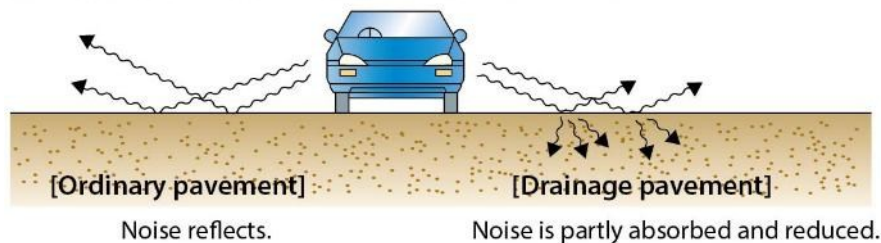
The manmade island "Umihotaru" and the Aqua-line Bridge

Pavement

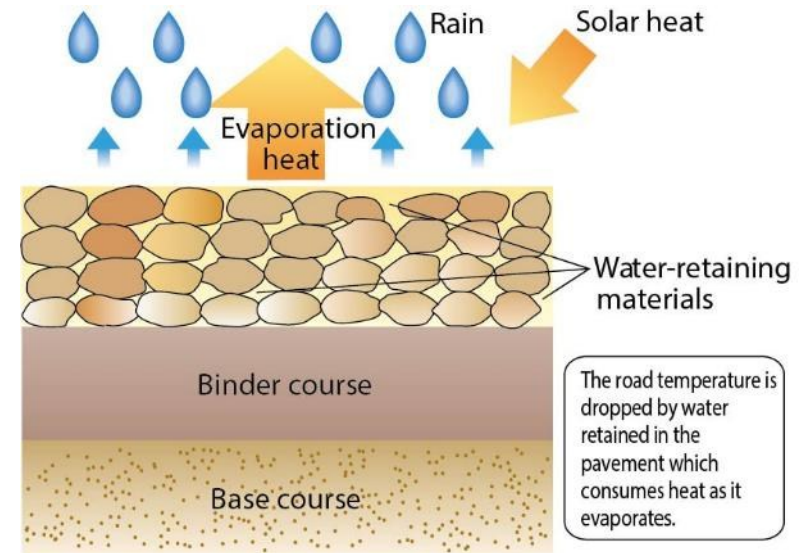
Drainage and low-noise pavement



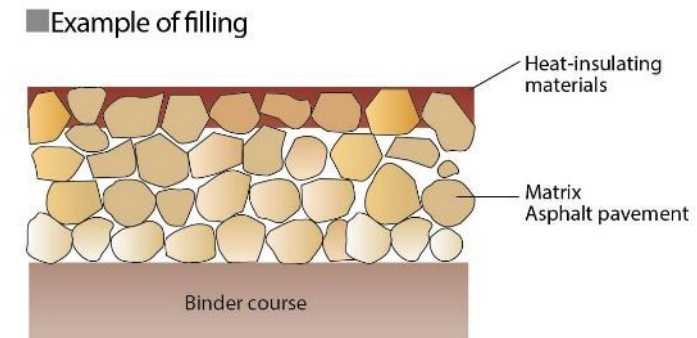
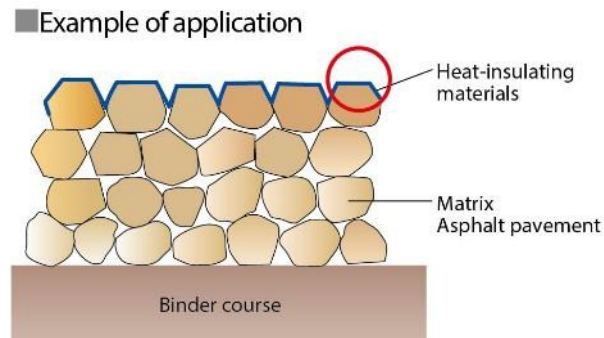
Reduction in the noise level by changing the pavement to one that absorbs rather than reflects vehicle noise on the road surface.



Water-retaining pavement



Heat-insulating pavement



Utilization of New Technologies : Inspection Support Technology Performance Catalog

Bridges and Tunnels (From Feb 2019) Earthwork (From Nov 2023)

Image measurement

- Bridges: 91 (11) technologies
- Tunnels: 40 (2) technologies
- Earthwork: 10 (3) technologies



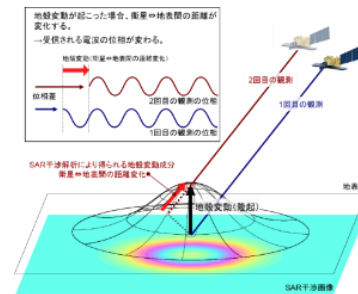
Damage assessment by drone



Deformation assessment by laser scan



Slope and retaining wall inspection using MMS*1



Road earthwork and disaster prevention inspection using satellite SAR, etc.*2

Non-destructive testing

- Bridges: 48(4) technologies
- Tunnels: 25(2) technologies
- Earthwork: 2 (-) technologies



PC grout filling assessment using AE sensors



Tunnel lining deformation assessment using radar

Measurement and monitoring

- Bridges: 76 (5) technologies
- Tunnels: 22 (3) technologies
- Earthwork: 1(1) technologies



Bridge monitoring using optical fiber sensors



Anomaly monitoring sensors for tunnel accessories

*1 Mobile mapping system (MMS)

*2 Source: Geospatial Information Authority of Japan website

*Number in parenthesis indicate new technologies added in April 2026

Data collection and communication

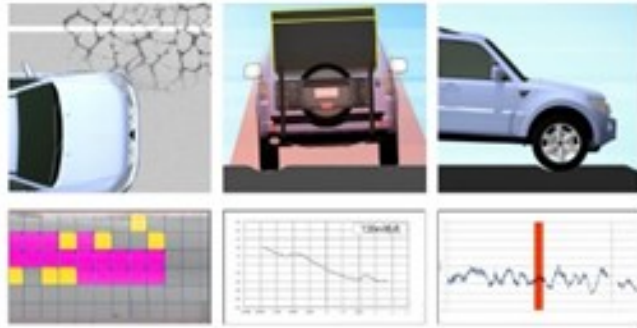
- 5 (1) technologies

Utilization of New Technologies : Inspection Support Technology Performance Catalog

Pavement_(From Sep 2022)

Crack rate, rutting, IRI

(55 (15) technologies)



Automatic judgement by AI

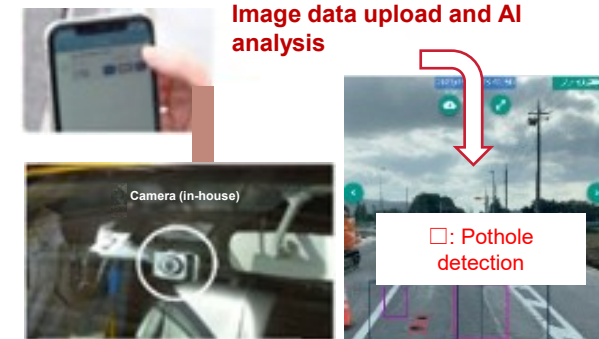


Pavement condition measurement using images and acceleration obtained by smartphone

Road Patrol_(From Mar 2023)

Potholes, lane line wear, exceeding clearance limits, hidden signs

(32 (7) technologies)



Pothole detection using images obtained by smartphone



Lane line wear judgement using images obtained from drive recorder