



Making a Road

by Andrew Gunn

There are over ninety thousand kilometres of roads in New Zealand. Have you ever wondered how they are made?

Planning

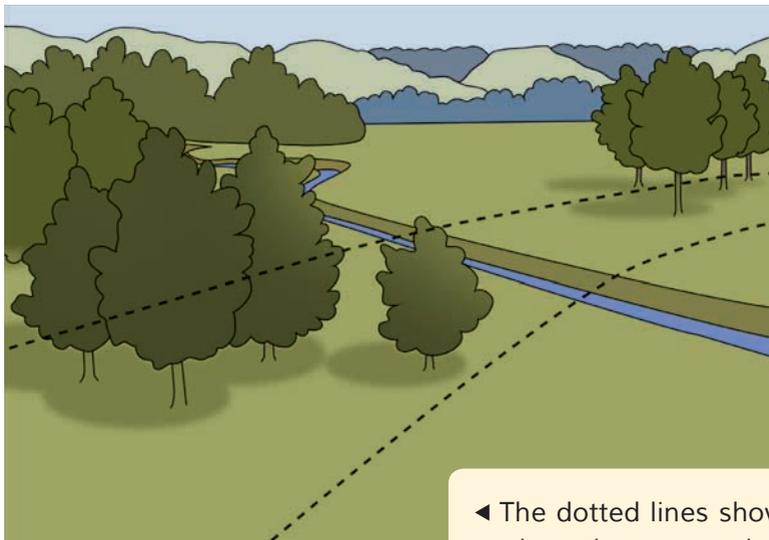
There are many reasons for building a road. Maybe the nearby roads are overcrowded and unsafe with too many vehicles on them. Maybe a new area of housing is being developed. People will need a road to get to and from the new houses. Before any new road is made, planners investigate to see if the road is needed.

The planners also think about the type of road that should be built. Who is likely to use the road? How many lanes will it need? Where will it join with other roads? Will it have to cross any rivers? Will it have to go over hills?



Checking the plan

The planners draw a map showing where the road could go. Then they use newspapers, brochures, and the Internet to let people know that a new road is planned. Sometimes the planners and the **engineers** (who will design the road) hold public meetings to explain their ideas. People who live nearby and who might use the new road have a chance to look at the map of the road and say what they think about it. Sometimes the people notice problems that the planners and engineers haven't thought about. After the planners and engineers have listened to what people say, they sometimes make changes to the design of the road. Then it's time to start road building.



◀ The dotted lines show where the new road will go.

Clearing a route

The first step is to **clear a route** (make a space where the road can be built). To make sure that people can drive safely and at a good speed, the road must not be too steep or too bumpy or have any sharp corners. Sometimes this means that a road might need to be a bit longer than expected, for example, it might need to zigzag up a hill rather than go straight up.

Bulldozers and excavators clear away trees, rocks, and soil. Motor scrapers take off a layer of earth from where there is too much and move it to where more is needed. Heavy rollers pack down the earth.

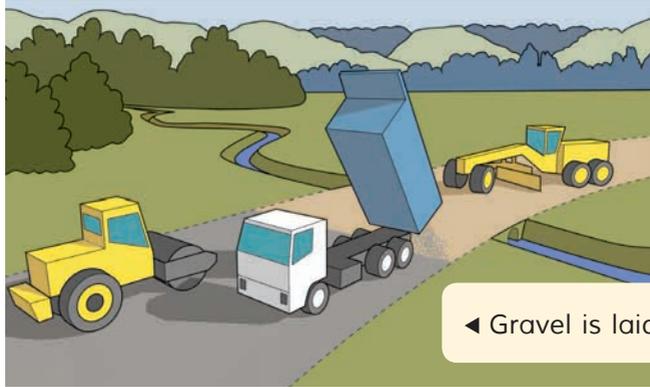


▲ Bulldozers and excavators clear the route.



Laying down the road

When the route has been cleared, the road can be laid down. A road is made of several layers. The first is **gravel**.



Dump trucks bring gravel and tip it out. Graders smooth the gravel, and then rollers go back and forth to pack it down so that the surface will be hard. The gravel helps to make the road strong so that when cars and trucks travel over the finished road, the road surface is not damaged.

▼ A grader and a roller smooth and pack down gravel.



▲ A roller works on the new road while vehicles drive on a temporary road.

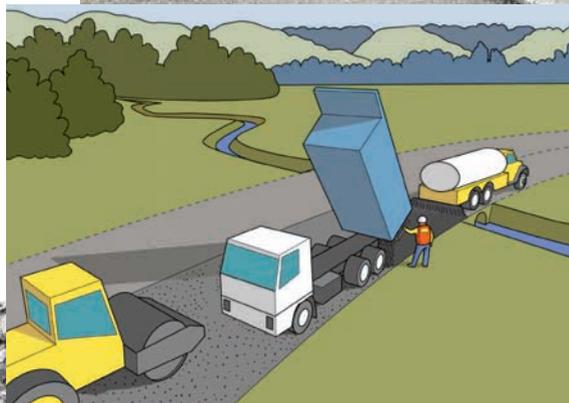
When all the gravel has been laid, a layer of **crushed stone** is spread on top of it, and again, graders and rollers smooth and pack down the stone. The pieces of crushed stone are smaller than the pieces of gravel, so the surface of this layer is much smoother.

The surface of the road is shaped so that it is higher in the middle than at the edges. This lets rainwater drain away to the sides so no puddles are left on the road.



Finally the top surface of the road is laid down. Most New Zealand roads are covered in **chip seal**. To make chip seal, **bitumen** (a black, sticky mixture) is sprayed on the road. Then crushed stones called **chips** are spread over the bitumen. Rollers push the chips into the bitumen, which acts like a glue to keep the chips in place.

▼ Bitumen is sprayed on the road.



◀ A layer of chip seal is laid down.

Chip seal



► Hot mix is laid down in a tunnel.

Some very busy roads are covered in **hot mix**. Like chipseal, hot mix is made from stones and bitumen. However, the stones are smaller, and they are mixed together with the bitumen before being spread out on the road. Roads with hot mix surfaces are smoother and more hard-wearing than roads with chip seal surfaces, but they cost more money to make.

Hot mix

Finishing the road

When the road surface is completed, it still needs to be made safe and easy to drive on. Traffic lights, signs, lane markings, and arrows all help to control traffic and show drivers where to go. A **rumble strip** makes a sound when wheels roll over it to alert drivers that they are straying off the road. At night, studs in the road reflect car headlights to help drivers see the road lanes.



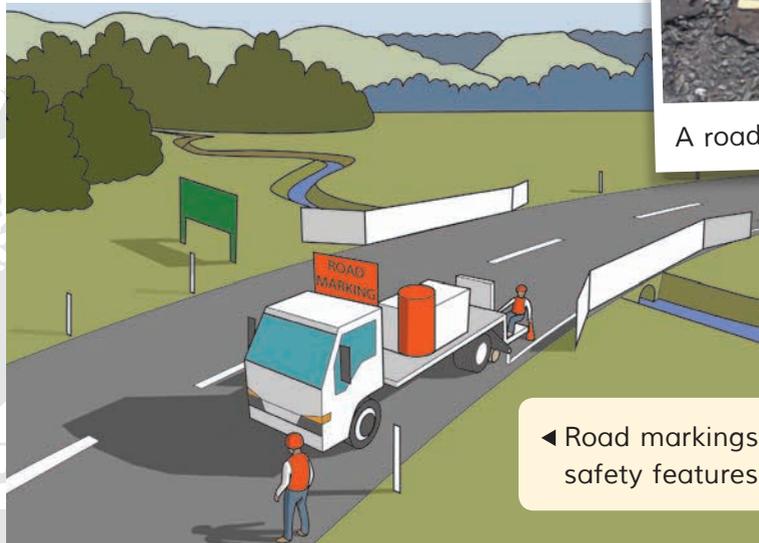
A traffic sign



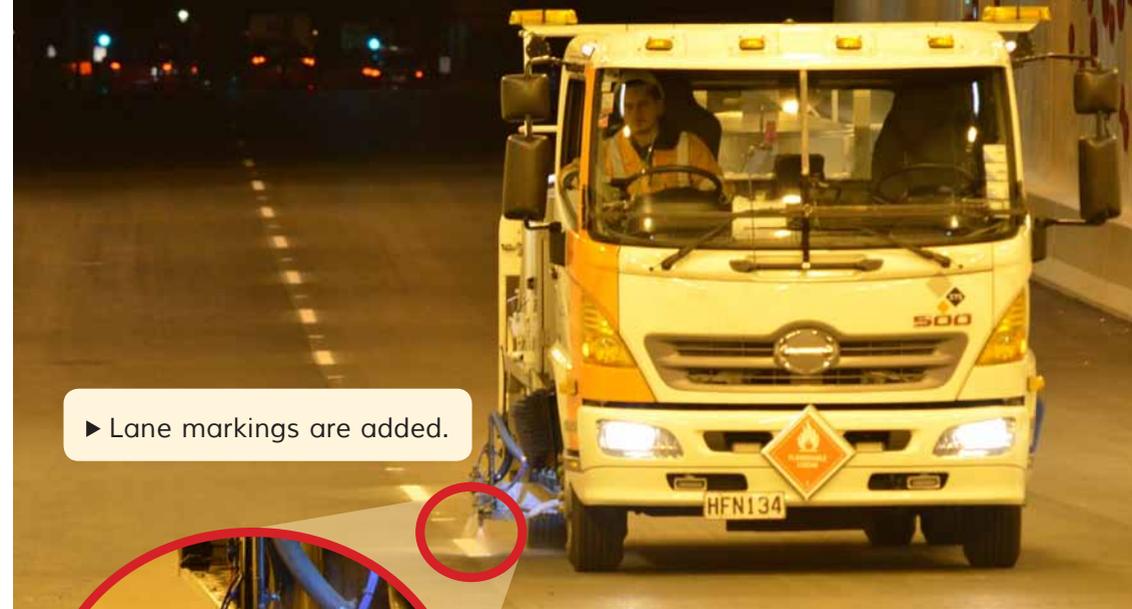
A rumble strip



A road stud



◀ Road markings and other safety features are added.



▶ Lane markings are added.



▲ A close-up photo of the truck spraying the lane markings

Once these have been added, the new road is ready to be used. Soon cars, buses, vans, and trucks will be driving over it – and most of the people in them will never think about how the road was made.



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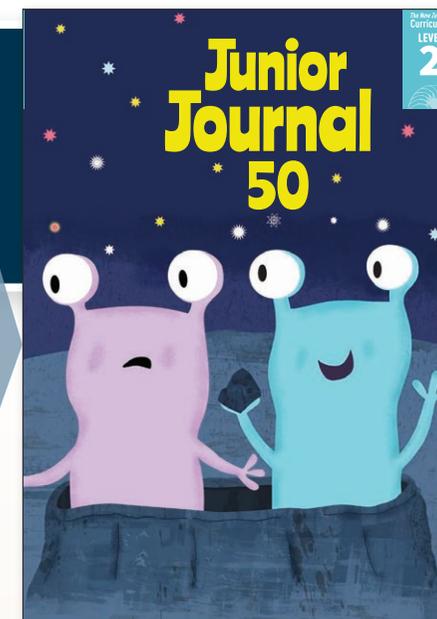
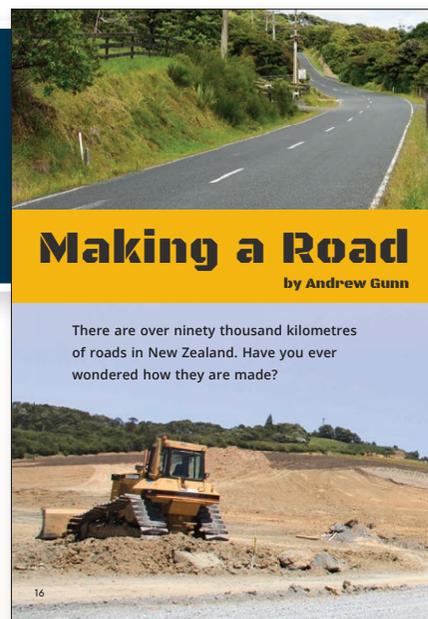
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