# Different Jobs on a Highways Project

## Who's Involved:

Highways Engineers
Geotechnical Engineers
Structural Engineers
Aesthetic Advisors
Surveyors
Transport/Traffic Engineers
GIS Analysts
AutoCAD Technicians
Electrical Engineers
Stakeholder Specialists

Environmental Specialists:
Ecologists
Hydrologists
Landscape Architect
Noise Specialists
Air Quality Specialists
Archaeologists
Land Specialists
Geomorphologists
Planners

# Highway Engineer

A Highways Engineer consultant works in an office and designs the road. They use design guides to help decide where a new road will go.

A new road has lots of different parts which a highways engineer needs to design, for example cutting the road in to a hill or lifting the road high on an embankment. There is drainage, so the road doesn't flood. There are utilities to divert, for example electricity, gas or BT cables to divert if the road goes over them. Highway engineers need to design the road surface, the bit that cars drive on. They also need to design footpaths. They calculate how much land is needed to build the scheme and they meet all the landowners affected by the new road.

We use special computer programmes to design all the road elements.

Highway engineers also write reports which describe new road options and then the best road. They need to manage all the other people working on the job too.

Highway engineers also write large contract documents so that the road gets built correctly. They then supervise the construction of the road.

A contractor builds the road which the consultant has designed.

# Stakeholder Manager

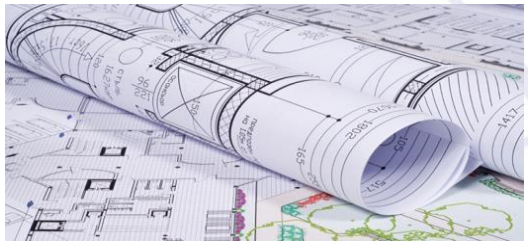
**Communication and Engagement Manager** – They talk to people. It is their job to make sure that all those people living along the A9 have information about what is happening in their area. They also need to make it easy for people to contact them and tell them information about the local area that might impact on the design of the road. Sometimes people worry about changes to the place that they live and it is important they have someone who can give them information about what is happening.

**Education Liaison Officer** – They work with young people from nursery to university to make use of all the information being collected while we design and build the A9. We bring lots of different people doing lots of different jobs into schools to tell the children about the amazing variety of jobs that they do and inspire them into careers linked to infrastructure. We provide teachers with resources to use in the classroom to explain the work going on as the project develops.

# Town Planner

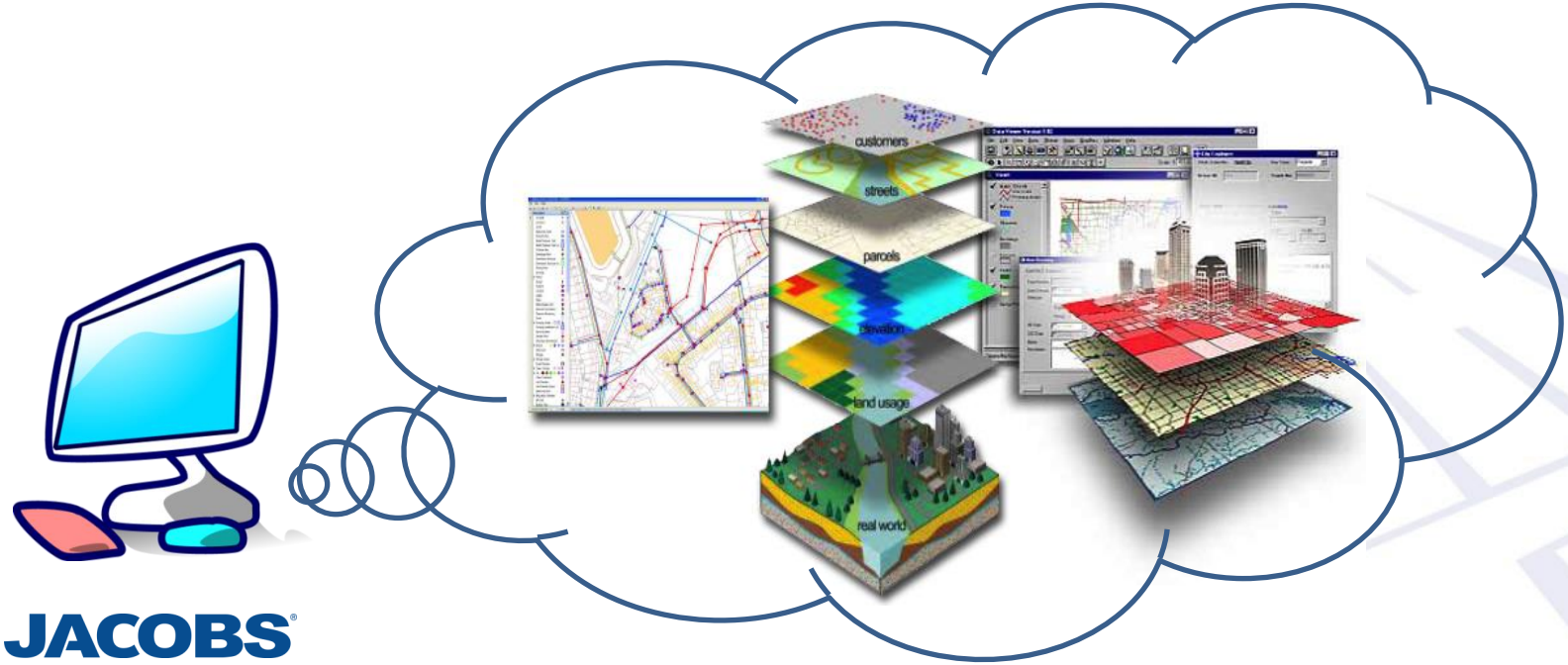
A town planner looks at how an area will grow (for example new houses, schools, shops and factories) and the effect this will have on local people and places. Every part of your town, village or countryside has a different use; be it to live, go to school, play or get places. These areas have changed over time and will continue to change as places grow and people move around. Involvement of local people to help government understand what changes should be made to their area is really important and it is our job to know the Council's plans and make sure our projects fit into them. For the A9 we have to make sure that the road is best placed in a location where it will benefit people living near the road as well as people using it. We also have to make sure that the effects on the quality of the environment are as little as possible. We work with all the different environmental teams (e.g. ecology, landscape, water, historic buildings) to understand the total effects of the project. Its like a jigsaw, making sure we have the right piece that fits in the right place.

Town planners read lots of council plans and report to help guess how a town will change in the future. They also have to be good at reading maps and they work closely with GIS analysts to produce maps which show the right amount of information. If big new housing developments or new schools are going to be built near where a new road is going, they tell the highway engineers how that will affect the new road, for example with lots more traffic.



# GIS Analyst

GIS stands for Geographical Information Systems. It's a fancy way of saying create and use maps on a computer to help make decisions, a bit like how you would use a map to find what's around you or how to get somewhere. As part of the A9 project, a GIS Analyst brings together all of the hundreds of bits of information that are used on maps. These come from a large number of sources such as Ordnance Survey and Scottish Natural Heritage. They are also involved in displaying the routes designed by the engineers. These are shown on paper maps that we make using computer software as well as online on a custom made website similar to google maps. The other teams on the project can then add their information on top of the designs to help them decide which design is best. As well as 2 dimensional maps, our team are also involved in creating 3 dimensional maps which let the public and clients see what a design might look like when it is built.



# Archaeologist

Archaeologists study how humans used to live through the remains they have left behind such as artefacts ( for example tools and coins),archaeological  monuments, buildings and the landscape around us. Our role on the A9 is to identify such remains and to advise the engineers as to how they can be protected or if this is not possible  how they can recorded before the road is built.

# Transport Planner

Transport planners consider ways to fix transport problems by making plans and projects which help develop our towns and cities. They also seek to change how people think about travel and they encourage use of different types of transport other than a car.

In the context of the A9, they use traffic surveys to see travel patterns (journeys people take) in computer models and predict changes in traffic that are likely to happen in the future as a result of changes in population and other factors, as well as the impact of upgrading the A9. These traffic predictions are used by the Highway Engineers to design the junctions and by environmental teams to assess noise, air quality and the other impacts that traffic may have on people living in towns near the A9. They also analyse car accident information and forecast the reduction in accidents that may be expected if a road is improved.

# Geotechnical Engineer

Geotechnical engineers are responsible for investigating the ground conditions along the proposed route of the A9 dualling works and for designing the earthworks to allow the new road to fit into the natural ground. We gather information from various sources of published information and investigate the ground conditions across the proposed route by undertaking a ground investigation which involves sinking boreholes and excavating trial pits. A borehole is where they dig a small but very deep hole in the ground to see what the soil looks like underneath. A trial pit is when they dig a larger hole in the ground, but not very deep.

The information from the ground investigation is used to determine the nature and engineering properties of the various soils, bedrock and also the position of groundwater. Using this information we build up a ground model which we use to understand and manage the risk posed by the ground conditions on the proposed works. This allows us to design the various earthworks features (cuttings and embankments) and also to design foundations for various structures such as bridges and retaining walls.

# Hydrologist

Hydrologists study the flow of rivers and try to predict how much water there will be in times of flood and drought, and identify how that may affect people and wildlife. We work with the road designers (civil and structural engineers) to design a road that doesn't make any flooding problems worse, and that it can still be used to get help to people that may need it. We also make sure in times of drought the design doesn't stop fish and invertebrates moving around the river freely, and that the quality of the water isn't affected.

We try to predict the impact that climate change may have and design this all accordingly. We base our decisions on what we think is likely to happen in the worst flood in 200 years.

To do this we use measurements of flows and rainfall taken for 50 years or more, surveys of the shape of the river channel and surrounding land, and computer models to undertake hundreds of thousands of calculations.

# Landscape Architect

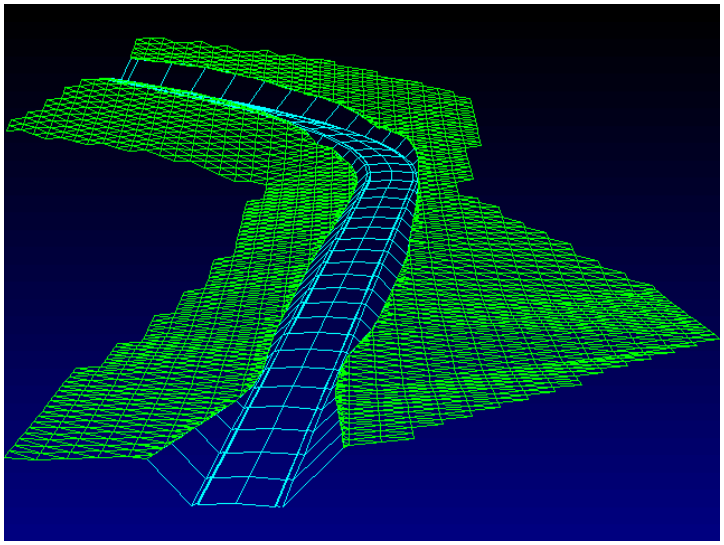
Landscape architects design areas such as parks, gardens, school grounds, business parks and other outdoor spaces in towns and the countryside. They also do landscape and visual assessments (what something will look like) and design to help new projects like roads, power stations, and new housing areas fit into the environment. On the A9 their role is to learn about the different types of countryside that the road passes through and then help to design the new road to fit the shape of the land. They decide where to plant new trees to be in keeping with the local landscape, to hide views of traffic from nearby houses and outdoor places used by people like footpaths and cycle tracks, and to provide wildlife habitat.

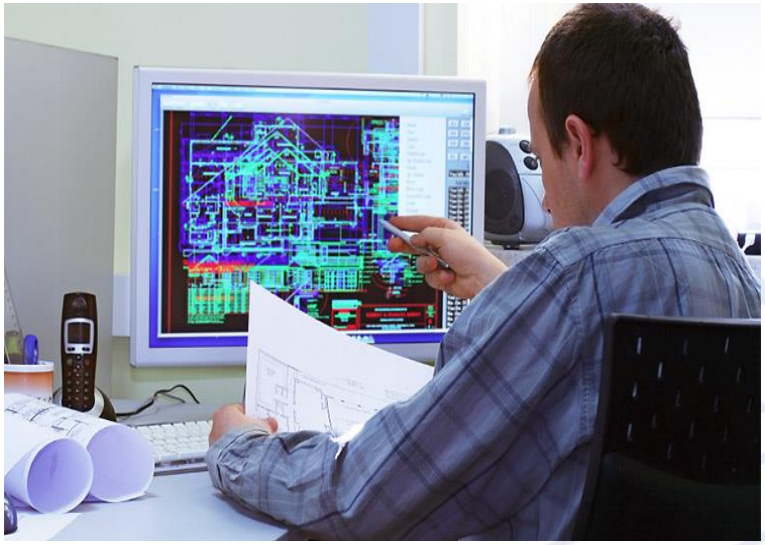
# AutoCad Technician

An AutoCad technician uses a computer to make drawings and plans. They work closely with the Highway engineers and put the new road model which, the Highways engineers have designed, on to a plan.

They make lots of different plans showing the road from lots of different angles. They make plans which show not only the road but also the land we need to use to build the scheme, they use different scales to show parts of the road close up, they prepare drawings which show all the road signs and also road markings needed for the new road, they prepare detailed drawings showing the structures, they prepare drawings showing all the public utilities on the road – BT, SSE, Gas, Water etc.

AutoCad technicians have to be good at reading maps and also have a keen eye for detail.





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# Noise / Air Quality Specialist

**Noise Specialist**

Noise specialists look to see how much more, or less, noise a new road will make to people living nearby. They use special equipment at lots of different locations where the new road will go and gather information on the noise levels before a road is built, then they work with the highways and traffic engineers to work out how much more traffic will be on the road and if it will be noisier or quieter.

They use special computer equipment to calculate the noise in the future. This information lets the environmental and highways engineers know if they need to build special fences or mounds of soil (an earth bund) to help make the road quieter.

**Air Quality Specialist**

Like a noise specialists an air quality specialist uses special equipment to test the air quality. They then speak with the traffic and environmental engineers to see how much traffic will use the road in the future and this allows them to calculate the air quality in the future.

They read lots of information and write reports and work closely with environmental engineers to try to reduce any affect on air quality.

# Land Use Specialist

Although much of the A9 dualling project involves improving the road along its existing route, parts of the road structures (bridges, side roads and drainage ponds) will have to be built on agricultural land and on land that currently grows trees. The road will also cross rivers, burns and lochs in the area (for example the River Tay, River Tummel and River Garry) and these are used by fishermen for salmon and trout fishing. In the higher stretches of the road it passes through moorland which is used for shooting and stalking (grouse and deer).

Farmers, foresters, fishermen and game keepers will need to be able to use the land and rivers once the A9 is dualled. Lots of the access points to farms, fields and forests are currently taken directly off the A9 and these will not be able to be used once the road is dualled.

Land Use specialists in agriculture, forestry and sporting impacts are able to talk to farmers, woodland managers, estate managers, angling associations, ghillies, and game keepers to understand how they may be affected by loss of agricultural land and woodland and how their daily activities may be affected by the proposed road. The Land Use specialists can then speak to the engineers and make sure that the scheme design incorporates new access points to farm steadings, land and forests (this might include overbridges or underpasses). They will also consider other impacts on things like soils, land drainage, field fences and dykes and where livestock get their water to drink. They will decide what new facilities need to be installed or existing ones need to be reinstated so that when its time for the scheme to be constructed, the construction contractors will know what to replace or repair.

# Surveyor

A Land Surveyor makes maps of the existing ground to give to the highways engineers. This lets the engineers see the levels of the ground so that they can calculate how to fit a new road over it. The maps show all of the detail as it is at the moment with houses, trees, roads, railways and features down to as small as manhole covers plotted. There are points showing the level of the ground shown every 10 metres on the map and contour lines, which are the lines joining points of equal height.

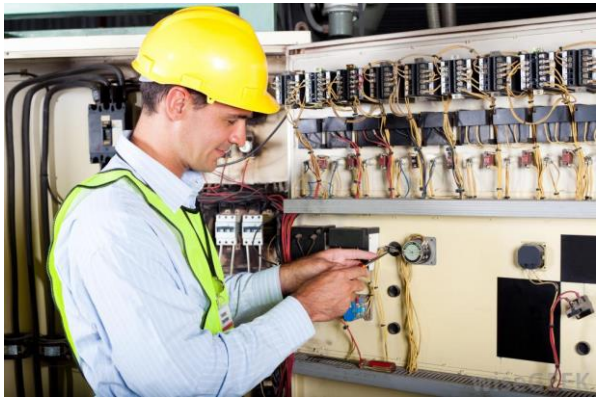
Surveyors go out on site and measure a lot of the information and you might see them out and about with yellow tripods and surveying equipment. A lot of the information is mapped from an aeroplane with a special camera and laser system on board. We also go out in a boat and measure the depth of rivers like the Tay and Tummel to let the engineers design new bridges and make sure that the new road won't cause flooding.

The maps used to be plotted out on paper but now they are given to the engineers as computer models which load into their design software. This lets the designers see the ground as if it is in a computer game and makes it much easier for them to design a new road.

# Electrical Engineer

Electrical engineers work with highways engineers and design any lighting which may be needed on the road. Quite often junction need to be lit and so it is electrical engineers that work out the type of lampposts to be used and also how to get electricity to the lampposts.

Electrical engineers also design how road signs and also information signs in laybys will get electricity to them.



# Geomorphologist

Geomorphologists look at the land and how it will change over time. They research the history of the land and predict what it will look like in the future. They will look at the route of rivers and predict if they will move in the future and what they may look like.