



Q&A

WORLD WITHOUT SURVEYORS



Q1: The Last Surveyor's super squad have got straight to work! Some are looking at the aqueduct: the boat-carrying bridge. Can you spot three hazards that might cause the bridge to break?

A: Like many modern cities, Middletown has grown and developed at an exponential rate! But without surveyors to ensure safe construction and monitor buildings for faults, the city is now one big wobbling hazard - with some especially dangerous parts, like the aqueduct! The bridge might look big and strong, but did you spot the water seeping from the waste pipe near the bus stop? Water damage could weaken the support beams, and the weight of the bridge could cause them to collapse. The creeping cracks, caused by the tunnelling machine in F,2, could soon stretch to the base of the beams. If they reach the structure they could cause the whole thing to come down! Finally, because of poor planning and construction, the boats using the

aqueduct have become stuck, and have collided! If the force of the crash was great enough it could damage the aqueduct itself, putting everyone on it, and under it, in danger.

Thankfully, hard-working surveyors like the one in E,3 are on hand to monitor important structures like this bridge. They use laser scanners to create 3D models of bridges, which they check for movement and damage. They can even do this virtually, in an office, so that surveyors don't have to spend too much time at a dangerous site! If they find that a structure has moved or developed a fault, they can take action to prevent any accidents from occurring.



Q2: The road layout in this city is like a plate of spaghetti - messy and tangled! And the street surfaces are in a terrible state. Can you give the surveyors a head start and spot some road-based risks?

A: There are so many driving dangers on the roads of Middletown! Did you spot the vast cracks and potholes in D,2 and F,3? How about the number 93 bus stop - built in the middle of the street! There's wonky pedestrian crossing posts, trip-hazard waste pipes plumbed into the road, and poorly-planned, patched up bridges that actually go through the buildings!

Thankfully, surveyors like the one in B,4 are on hand to help. They can use special equipment to make sure roads are built straight, smooth and safe - although this one might be more likely to have to do a different job that surveyors sometimes do on roads: a traffic accident survey! If a collision happens, it's important to record all the information, so that authorities know who or what was to blame. Surveyors might use something like a Leica



Geosystems 3D Laser Scanner to capture details such as broken glass, tyre marks, vehicle positions, damaged car parts and road defects. This information can be captured quickly and stored forever, so that anyone who needs evidence for what happened has access to a clear, accurate record of events.

Also rolling down the roads of Middletown are a pair of very special vehicles! These were designed by two young future-surveyors, who entered a Get Kids into Survey competition to design a city-saving robot vehicle of the future! The vehicle had to collect and recycle trash into something useful, detect and fix structural damage, and clean and sanitise any hazardous spills. It also had to be autonomous (self-driving), and powered by a clean energy source! Can you spot the two competition-winning machines out there making Middletown safer?

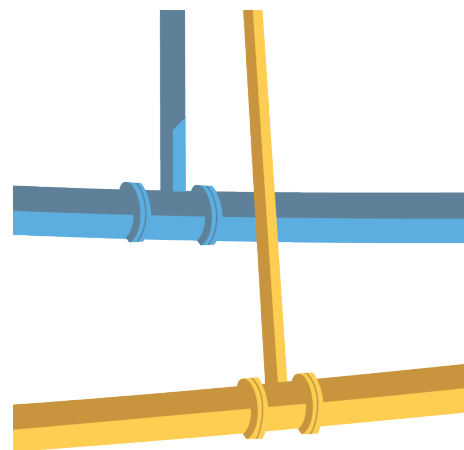
Q3: Kwame's blue mech is having a tough time in F,1 - he's holding back a hulking machine that seems to have taken a wrong turn! Can you find out what that machine is, and what it does?

A: This mega machine is called a tunnel boring machine (TBM), also known as a 'mole' - for reasons that Kwame is finding out right now! It's job is to excavate circular tunnels through a variety of layers - from sand, to soil, to hard rock! They come in handy when digging tunnels for things like underground railway systems - like the one being used by the Downtown train in E,1. The largest tunnel boring machine in the world is known as the 'Tuen Mun-Chek Lap Kok tunnel boring machine': it has a diameter of 17.6 metres - imagine a spinning London bus! Even Kwame's mech would struggle to stop that one!

So how did the TBM in Middletown get so spectacularly off-track? The answers lie with the lack of surveyors! Without a team to scan the underground layers, tunnels and utility pipes, and to use that information to plan out a safe, accurate path for the TBM, the machine's operators have lost their way - and now Kwame has to handle the rubble trouble!

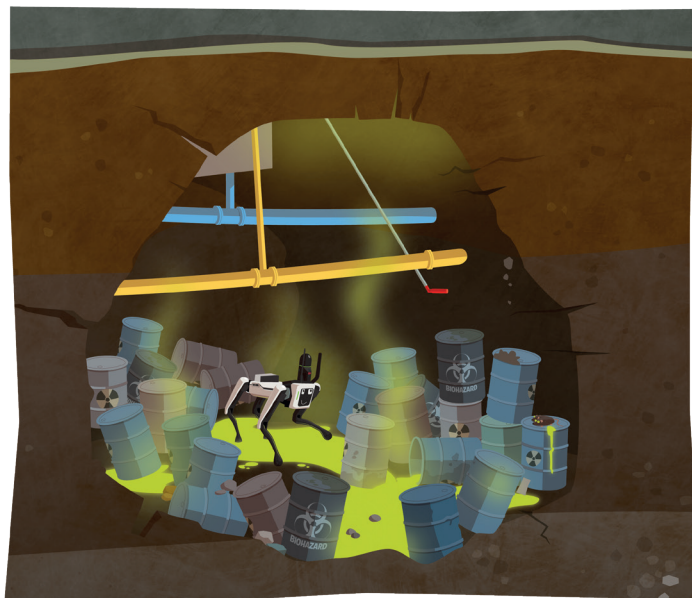
Q4: There's plenty of poorly-planned piping in this place - from overhead cables belching bolts to a broken blue utility pipe making its own duck pond! Can you find out what's in the yellow pipe?

A: To make life easier for teams working below ground, utility pipes are colour coded. Let's be glad that it was the blue pipe that sprung a leak - and not just because it's giving that duck a nice place to paddle! The yellow pipe carries flammable contents, including gas, oil and petroleum; if it had been broken, the whole of Middletown might have gone up in smoke and cinders! Surveyors play an important part when planning out utilities; they make sure that things like gas pipes (yellow), electrical lines (red) and water supplies (blue) are installed in safe places, free from obstruction or potential hazards. They will also make plans of the installation, like a pipe map, so that teams who come to work on the site afterwards will know exactly where all the important utilities are.



Q5: In B,2, Setsuko's green mech is exploring a gross green gas leak. She's also sent her four-legged robo pal underground for a sniff around! Why might it not be safe to send a human down there?

A: That stinky smog signifies a potentially lethal situation brewing below Middletown's Corn_r Store! And, because Setsuko can't be sure what's causing the leak, she won't risk sending a surveyor down there. Instead, she's attached a special scanner – a Leica BLKARC – to a robot dog! Using this, she can scan the cavity and see what lies beneath the surface of Middletown, without putting the health of a human at risk. And it's a good job too, because Setsuko has made a shocking discovery! Toxic waste! To expand her investigation, Setsuko is also using a tool built into her mech: a telescopic cavity scanner, extending from her robotic finger. Alongside the hazardous waste, she's discovered that the roof of the cavity is cracked and likely to cave-in. Thank goodness that surveyors have ways to capture data in places like this without sending humans in!



Q6: Two members of the GeoSquad are propping up a pretty precarious pad in H,4! Can you find out what happens next by reading the first chapter of their comic on the Get Kids into Survey website?

A: Upon their arrival to Middletown, 2049, the GeoSquad identify many pressing problems: drunk tower blocks, concrete chasms, extreme extensions and busted bus stops. But the danger that they identified as the most imminently-catastrophic was a house that had been built on a ledge, attached to the side of high rise building with PVA glue and gaffer tape. And as if this wasn't bad enough, the owner refuses to shift! Or at least, he does, until his home breaks away from the building and plummets, with him inside, towards a school playground full of children...

What happens next? Find out for yourself in the GeoSquad Comic!

