



How is the MRT System built?



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On a sunny afternoon, Anna is waiting for her cousin and uncle.

She is excited. They are going to visit her
uncle's workplace today!

She spots them and calls out, "Kenny! Uncle Joe!"

"Hi Anna!" Kenny waves at her enthusiastically.

The bespectacled man next to Kenny smiles warmly.

"Hello, Anna! Today I'll show you both how we build
a new MRT line."

"How exciting!" Anna exclaims,
"Let's go, Uncle Joe!"





CRUNCH!



CLACK!



HARD HAT



SAFETY BOOTS



SAFETY VEST



They take a short walk, and arrive at a gigantic green wall. “This is the worksite of a station on Singapore’s upcoming Thomson-East Coast Line,” Uncle Joe says.


“What are we waiting for? Let’s go!” Anna exclaims as she runs towards the entrance.

Stopping her, Uncle Joe says, “Not so fast, young lady!”

He hands each of them some safety gear.

“Safety is always our first priority. Keep your safety gear on at all times whenever you’re in the worksite.”

“Okay!” both of them agree in unison.



Kenny gasps, “Wow Daddy,
this is where you work?”

“Everything looks so big from here,”
Anna says.

Uncle Joe says, “Of course it is. It’s a big project
involving lots of people, and lots of steps!”

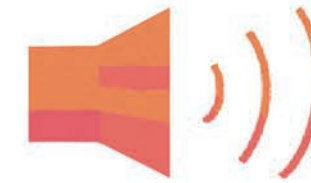
“Where do we even start, Daddy?” Kenny asks.

Uncle Joe says, "Before we start building, we need to consider the health and safety of everyone. We first check what impact building the MRT station will have on the area."



NOISE

Will the noise disturb anyone else?



VIBRATION

Will there be too much vibration for the surrounding structures?



WATER

Will the water nearby be affected?



AIR

Will there be too much dust in the air?

“We also take extra care to reduce the impact on the animals and plants in the area, and try to preserve as much of nature as possible,” says Uncle Joe.

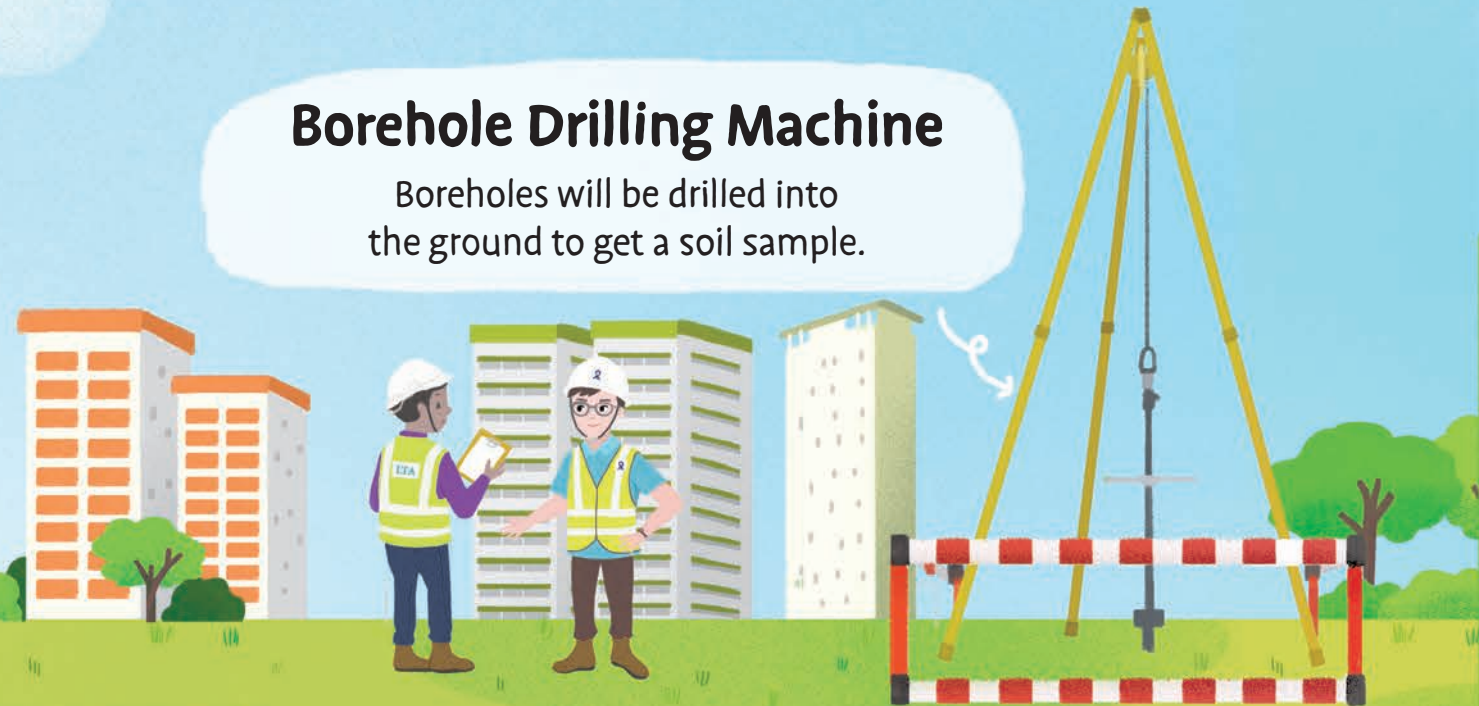
Kenny says, “Yay! That’s great to hear!”



“We also use a few methods to help us learn different things,” Uncle Joe says. “For example, we have to find out if the soil is strong enough for the stations and tunnels, or if strengthening needs to be done.”

Borehole Drilling Machine

Boreholes will be drilled into the ground to get a soil sample.



Soil Testing

Soil samples will be taken back to the laboratory for more tests.



He continues, “We can use machines to scan the ground without digging into it too.”



What We Can Find Out:

- How big are the rocks?
- How deep and dense are the rocks and soil?
- How are the rocks and soil layered?

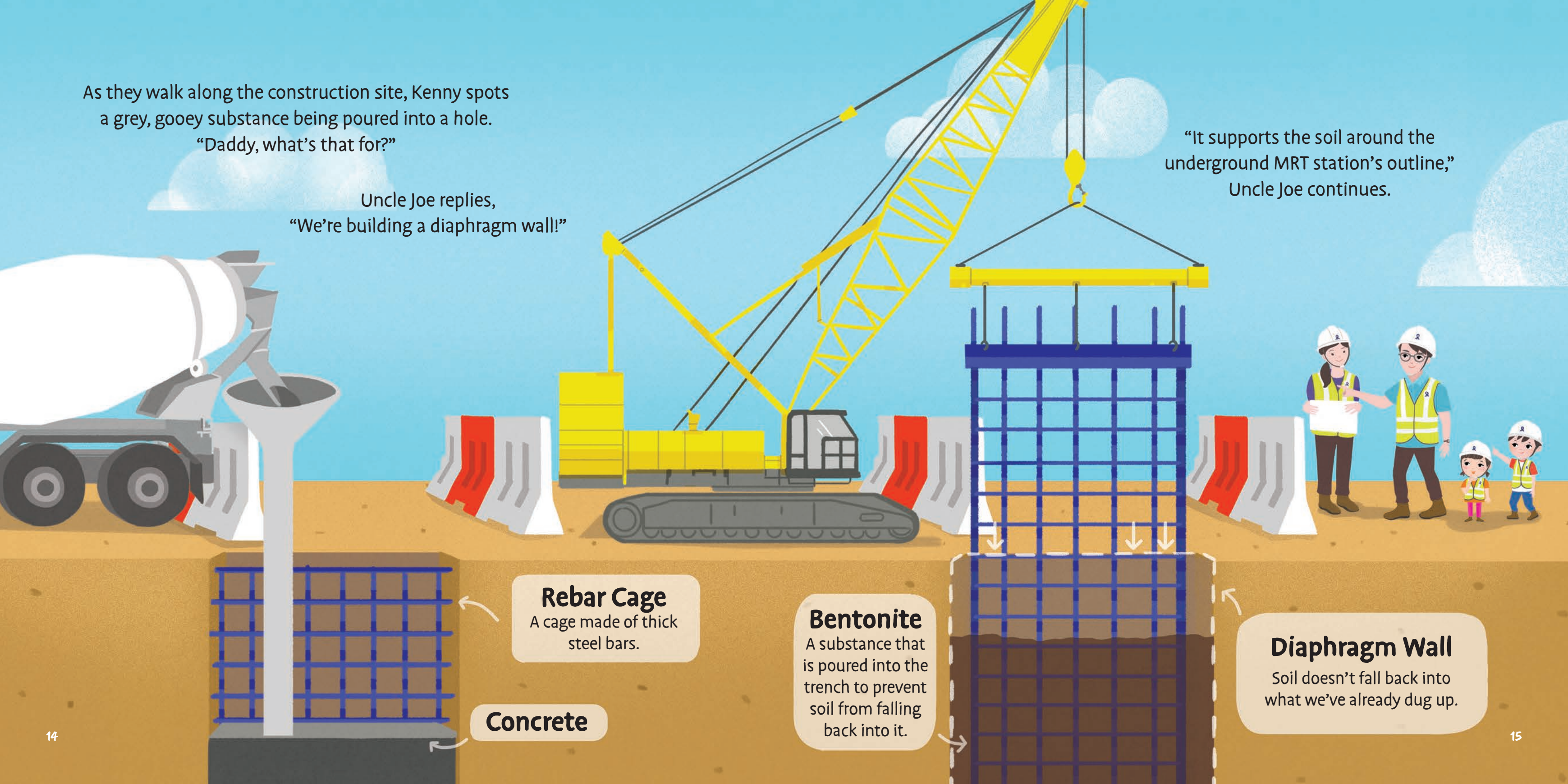


As they walk along the construction site, Kenny spots a grey, gooey substance being poured into a hole.

“Daddy, what’s that for?”

Uncle Joe replies,
“We’re building a diaphragm wall!”

“It supports the soil around the underground MRT station’s outline,”
Uncle Joe continues.



Rebar Cage

A cage made of thick steel bars.

Bentonite

A substance that is poured into the trench to prevent soil from falling back into it.

Diaphragm Wall

Soil doesn't fall back into what we've already dug up.

Concrete

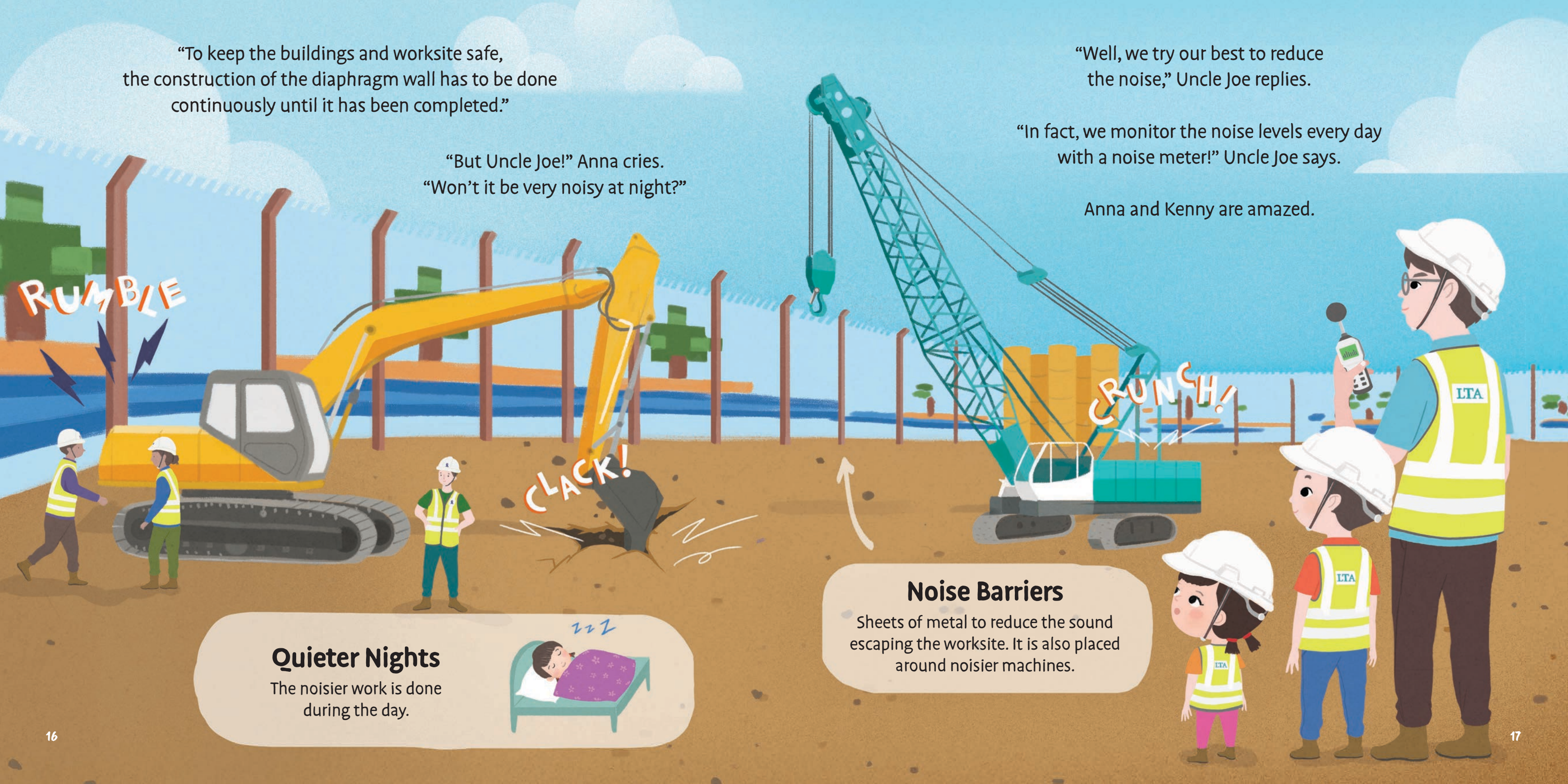
“To keep the buildings and worksite safe, the construction of the diaphragm wall has to be done continuously until it has been completed.”

“But Uncle Joe!” Anna cries.
“Won’t it be very noisy at night?”

“Well, we try our best to reduce the noise,” Uncle Joe replies.

“In fact, we monitor the noise levels every day with a noise meter!” Uncle Joe says.

Anna and Kenny are amazed.



Quieter Nights

The noisier work is done during the day.



Noise Barriers

Sheets of metal to reduce the sound escaping the worksite. It is also placed around noisier machines.

Kenny wonders out loud, "Daddy, where are the MRT tunnels?
How are they built?"

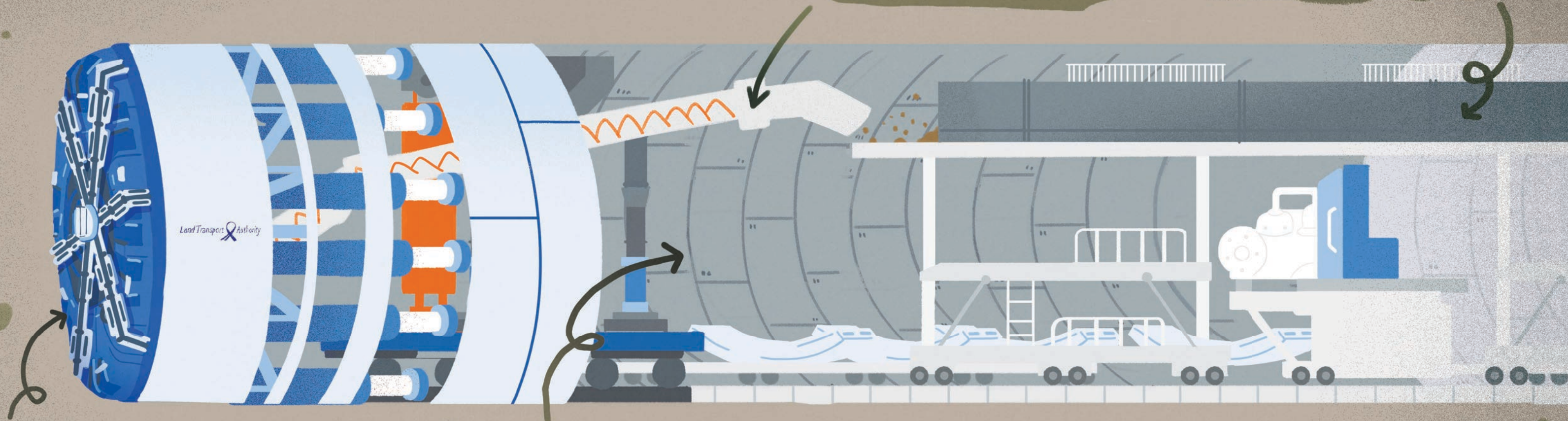
"That's a great question, Kenny!" Uncle Joe answers.
"We use a Tunnel Boring Machine to build them."

Screw Conveyor

Moves the earth that has been cut away to the conveyor belt.

Conveyor Belt

Loose soil and rocks are moved to the back of the machine.



Cutterhead

A powerful cutting tool.
It rotates and eats away
at the earth.

Concrete Rings

As the machine moves forward, the
tunnel walls are fitted with concrete
rings, forming a tunnel.

"The Tunnel Boring Machine is like a giant earthworm. Earthworms eat soil
from the front, and expels it all at the back," he continues.

"The Tunnel Boring Machine consists of a cutterhead, screw conveyor, concrete rings,
and a conveyor belt. Just like the earthworm, it moves soil from the front to the back!"

“How long are the tunnels? Do you have to walk in them every day when you work?” Anna asks.

“I’m glad you asked!” Uncle Joe says. “The tunnel between two stations might seem short but an entire MRT line can be more than 40 kilometres long. We walk in them when we carry out inspection works, and also use drone technology to take pictures and videos of hard-to-reach areas.”

Drone

A remote-controlled flying machine that lets you see things from above!

Both Anna and Kenny are amazed at all the work that goes into building the MRT system. They did not know that so much technology is behind it.



“Our job is to make the stations safe, accessible, and enjoyable for every commuter!” says Uncle Joe.



“Kids, it’s time to go home. The sun is about to set,” Uncle Joe says.


As they walk towards the exit they see some workers entering the worksite.

Uncle Joe waves at his colleagues and shouts, “Hey guys, thanks for taking over the next shift!”



“Isn’t it tiring for you, Daddy?” Kenny asks.

“Yes, it’s hard work. But I love my job.”



"I always feel very proud after completing every project. Soon, everyone will get to enjoy greater convenience!" Uncle Joe says, as the three of them make their way back to the MRT station.



As they board the train home together, Anna thought to herself, "When I grow up, I want to be an engineer and build the MRT system, just like Uncle Joe."





DID YOU KNOW?

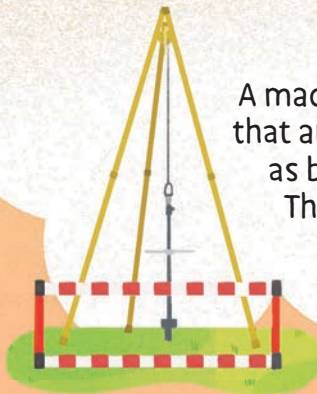


Concrete

A mixture of cement, sand, gravel, water, and other elements. It is normally used in the construction of buildings and pavements.

Borehole Drilling Machine

A machine that drills narrow holes that are 50-60 metres deep, known as boreholes, into the ground. That is the height of a 16-20 storey building!



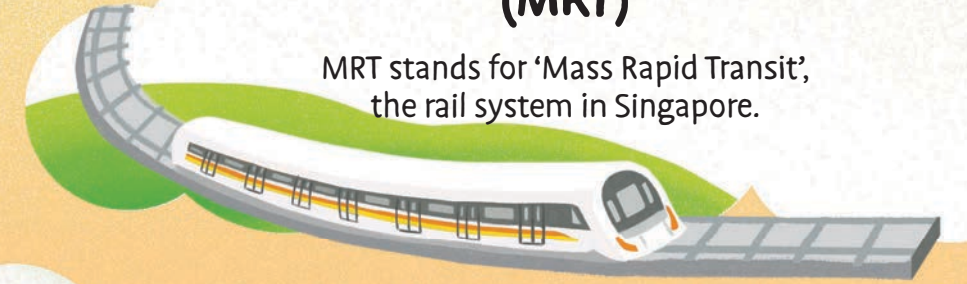
Engineer

A person who designs, builds, or maintains engines, machines, or structures – just like Uncle Joe! These engines, machines, or structures can be anything from the gantries in the MRT stations, to the tunnels that our trains run through!



Thomson-East Coast Line (TEL)

It is the sixth rail line of the MRT system that will link the northern and eastern regions of Singapore. Spanning 43km long, the TEL will have 32 stations when completed!



Mass Rapid Transit (MRT)

MRT stands for 'Mass Rapid Transit', the rail system in Singapore.



Safety Gear

Garments or equipment designed to protect the wearer's body from injury at worksites.



Can you find
Anna, Kenny, and
Uncle Joe?

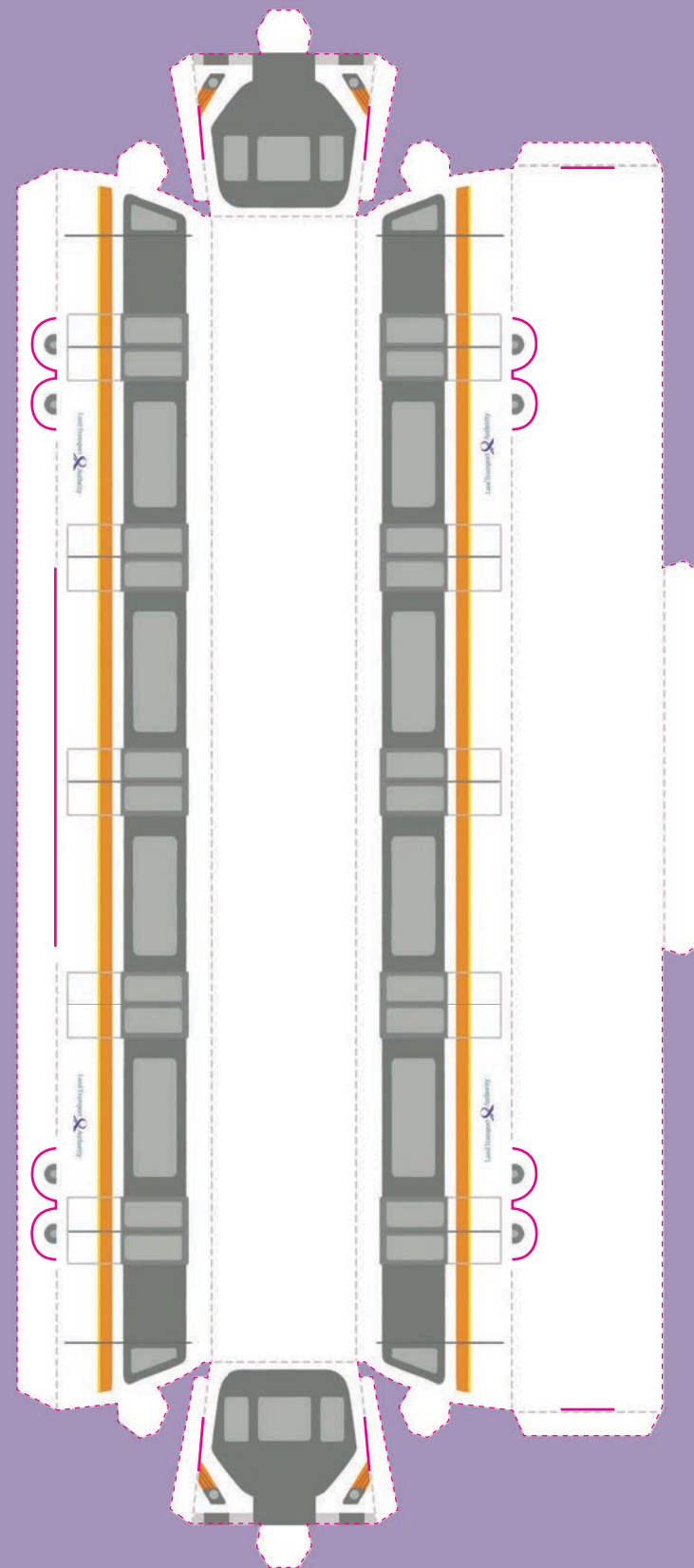




CONNECT-THE-DOTS

Drones help Uncle Joe and his team take pictures and videos of hard-to-reach areas, making it easier to inspect tunnels and stations.

Connect the dots to create one!



BUILD-A-TRAIN

Uncle Joe and his team have built the MRT tracks. Now, it is your turn to build your very own train!

Directions:

- 1) Detach the train model from this page.
- 2) Fold along the dotted lines
- 3) Insert the tabs into the slits
- 4) Enjoy your train!



WHAT DO YOU THINK?

Having followed Anna and Kenny on this exciting adventure, here are some interesting questions for you to chew on!



If you could build an MRT station, what would it look like? What features would it have?

How are MRT tunnels built?

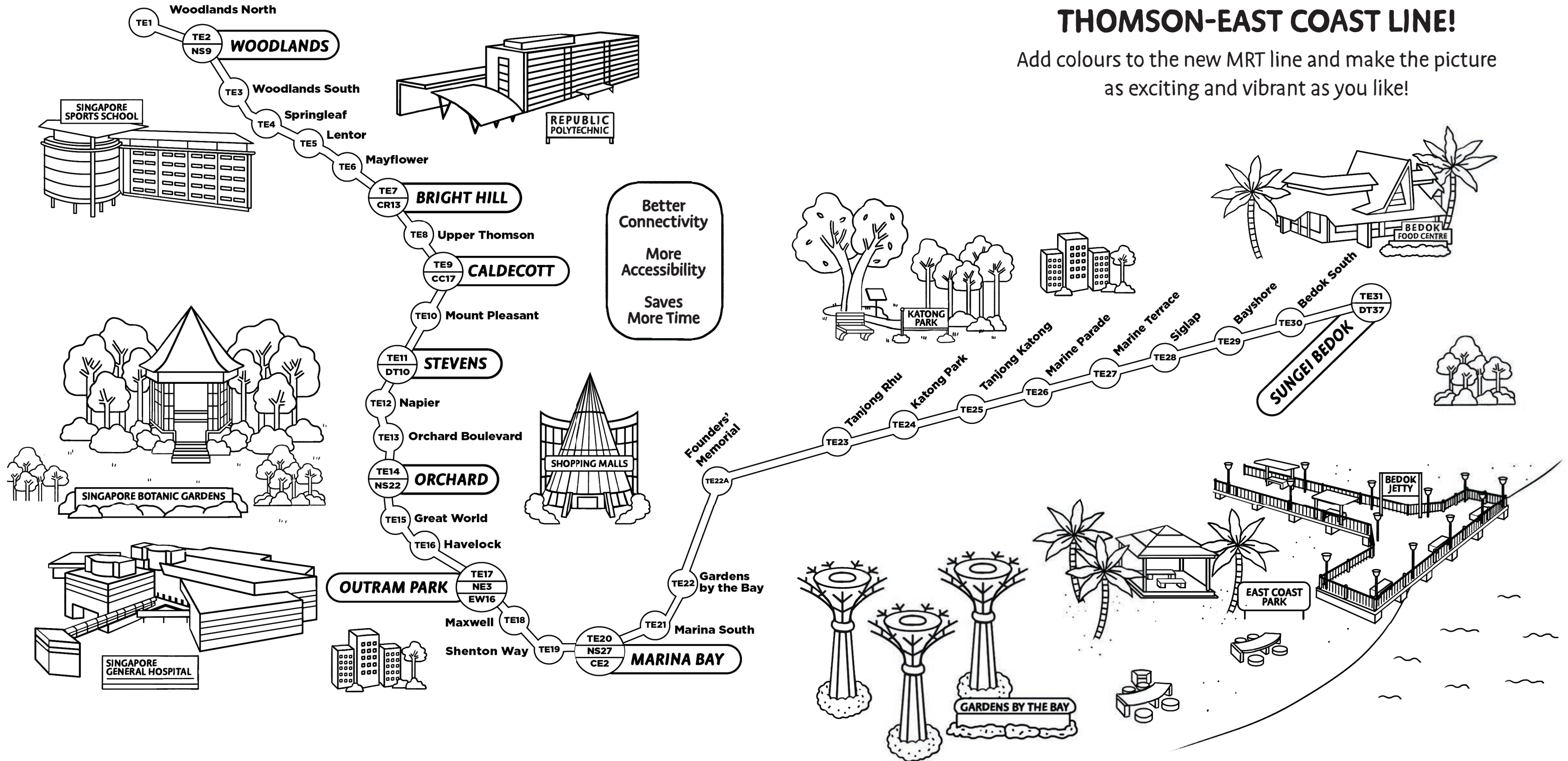


If you were an engineer, what would you like to build?



COLOUR IN THE NEW THOMSON-EAST COAST LINE!

Add colours to the new MRT line and make the picture as exciting and vibrant as you like!



DID YOU KNOW THAT OUR ENGINEERS USE DIFFERENT TOOLS AND MACHINES TO HELP THEM WORK?

Tell us which engineer works with these items by filling in the blanks with A, B, C, or D!

A. I use a Borehole Drilling Machine to discover more about the soil.



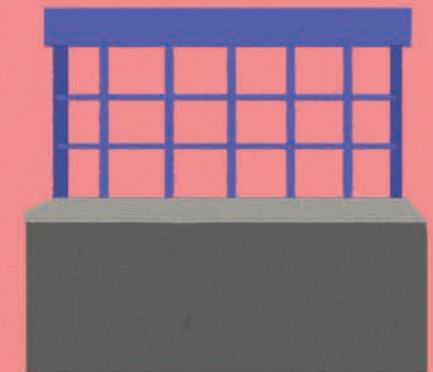
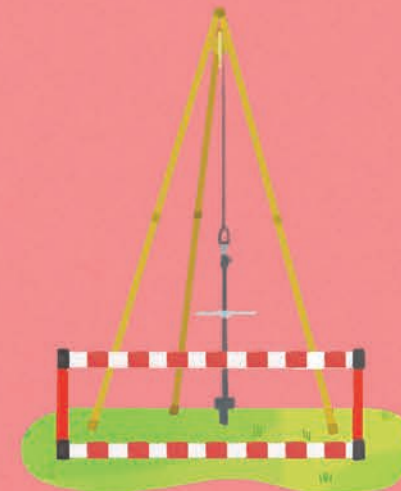
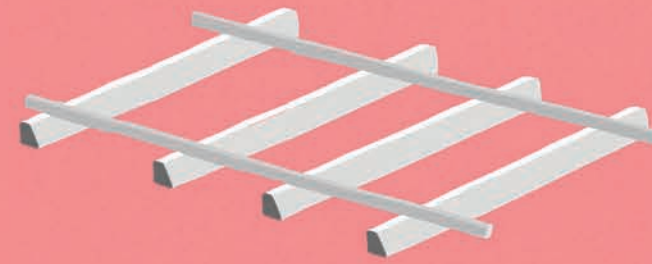
B. I inspect the tracks for trains to run on.



C. I supervise the construction of diaphragm walls, which help to support the structure of an MRT station.



D. I fly drones to carry out inspection works in a train tunnel.



NOTES

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All information in this book is correct at time of printing.

Follow Anna, Kenny, and Uncle Joe
on a journey of discovery, as they explore
how Singapore's MRT system is built.

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