

SMART TRANSPORT: FUTURE OF OUR COMMUTE

Land Transport Authority Annual Report 2017/18



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Create a people-centred land transport system.

MISSION

Connecting people and places, enhancing travel experience.

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Chairman's Message

FAST TRACK TO THE FUTURE OF TRANSPORT

Compact cities have healthier and happier residents, as they tend to walk and socialise more than those living in sprawling suburban towns. This was the result of a joint study by Oxford University and University of Hong Kong.

What is critical to the well-being of residents in urbanised cities is connectivity through a well-designed transport network. In land-scarce Singapore, our transport system faces the challenge of optimising land to meet the needs of our growing economy and population.

Some may question why we aren't expanding our road network to cope with increasing demand for vehicular movements. But this is an unsustainable solution, as roads already take up 12% of our total land area.

Instead, we have been working on improving our land transport system. Over the last five years, we have invested substantial resources to make public transport a choice mode of travel for commuters.

With this aim in mind, we made the major move to overhaul the bus and rail sector by taking over all public transport operating assets from the operators. LTA now owns all these assets under the Bus Contracting Model and the New Rail Financing Framework.

This is significant for two reasons. First, it enables LTA to be more responsive in making changes to public transport routes and asset replacement as travel patterns evolve. Second, operators can now focus on delivering quality service to commuters.

We will not stop there. In the next decade, our rail network will expand by 100km with continuous renewal of rail assets and the public bus fleet. Point-to-point transport options such as private hire cars, personal mobility devices and autonomous vehicles (AVs) will also form a bigger part of our transport landscape.

Singapore is conducting a variety of trials in AV technology. We have expanded the test area for such vehicles from 6km to some 70km, including mixed-use residential estates.

We will also introduce more electric vehicles on our roads, including electric buses and a nationwide electric car-sharing programme. Big data and artificial intelligence will be used to improve the transport system too.

With these new technological developments, we have to adapt and adjust. This means ensuring that our workforce grows with these changes so that the rise of automation will not render their skills redundant.

Transforming with technology

To ensure that our trains run smoothly, workers physically comb the MRT tunnels and rail tracks to check for anomalies such as cracks and water leakages.

This is a labour-intensive task that can only be done within a three-hour window after the last train ends for the day and before the next one starts running. Inspection is just the first step; engineers have to collate and analyse the data and take remedial measures.

Drone technology has made this task a lot easier. We have seen how drones are able to capture stunning aerial images. In the same way, these drones can be used in the MRT tunnels to take photos and videos. This technology allows potential problems and their exact locations to be accurately recorded.

This does not mean that engineers will be replaced by drones. We still need engineers to analyse the data collected by the drones, and take corrective actions. They will also need to operate the drones and use them to complete specific tasks.



The way ahead

This is why the Land Transport Industry Transformation Map is important. It serves as a blueprint to grow and transform the land transport industry into one enabled by technology, and supported by a highly competent workforce.

Over the next five years, LTA will invest in research and trials to improve the land transport industry, equip the workforce with skills to manage new technical tools and recruit fresh talent to take on newly-created jobs.

It is a mammoth task, but one that LTA is prepared to undertake. We have set aside \$25 million for mobility-related land transport research and trials over the next five years.

The Public Transport Skills Framework, an integral component of the Land Transport Industry Transformation Map, keeps workers informed of where the industry is headed, and how they can prepare themselves for the future.

It also guides training institutes, such as the Singapore Bus Academy and Singapore Rail Academy, in developing new training programmes for bus and rail workers.

Going for growth

With innovation, technology and a competent workforce, we aim to serve commuters better.

Technology will help us to develop safer and more efficient mobility concepts, while our enhancement and expansion plans will give commuters a smoother journey.

We will continue to transform our land transport industry – one that is Technology Ready, Workforce Ready and Ecosystem Ready for the future.

Through this, we aim to have a connected city where commuting – be it by rail, bus, car, bicycle, scooter, or on foot – is always convenient and comfortable. Which means citizens are healthier and happier in our compact city.

Chan Heng Loon Alan
Chairman

Chief Executive's Message

RAISING PUBLIC TRANSPORT TO GREATER HEIGHTS

Over the past year, we have reached many milestones. One key achievement is ensuring trains travel longer without a downtime, which is measured by the Mean Kilometres Between Failure (MKBF) – the longer the distance, the better.

I'm heartened that the MKBF hit 574,000 train-km in the first half this year, three times higher than last year's figure of 181,000 train-km. But we are still aiming higher, to hit a new target of 1 million train-km by 2020.

This MKBF breakthrough is only possible because the joint LTA and Rail Operators' teams have collectively worked hard to improve the reliability of our rail system. It is the backbone of our public transport infrastructure, with more than 7 million commuters riding our trains each day. We intend to continuously improve your commuting experience.

Refreshing our rail network

Rail renewal is ongoing. We have been upgrading six core systems of the North-South and East-West lines (NSEWL). We have replaced all sleepers and the third rail that supplies power to trains. Both lines have also switched to the new communications-based train control signalling system, from the previous fixed-block system.

We are now working on replacing 66 first-generation trains, and upgrading the power supply and track circuit systems on the NSEWL.

These changes will allow us to predict and detect faults earlier, leading to faster recovery of train services during downtime.

The rail maintenance staff are working hard to make these happen. The introduction of 'Early Closure and Late Opening' on selected train stations have allowed our staff to clock longer engineering hours to ensure that the upgrading work is completed on schedule.

Revolutionising rail operations

We are also going beyond rail renewal by adopting smart solutions to improve rail operations and maintenance. As Singapore develops into a Smart Nation, our public transport network must respond accordingly with the help of technology.

All our rail lines will progressively be fitted with an automated vehicle inspection (AVI) system of cameras, lasers, and sensors. This smart system, which monitors the health of our trains, picks up and sends back data to the depot where an immediate response is issued, instead of having to wait for an inspection during maintenance hours.

Once the system detects an irregularity, the maintenance team will quickly follow up to assess the problem.

The new depots at Tuas West and Mandai will also be equipped with an automatic vehicle inspection (AVI) system to monitor the health of trains. When trains pull into the depot, the system automatically picks up data such as the temperatures of gearboxes and axles without requiring a manual maintenance check. This data gives maintenance staff a clearer picture of how the trains are doing. Previously, inspections are carried out only after the trains complete their rounds for the day.

These two systems – ATI and AVI – allow us to capture data with speed and accuracy. This way, we can respond to anomalies in a timely manner.

We are also looking at using augmented reality and virtual reality to train our maintenance staff and enhance their skills. With augmented reality, we can use graphics and video overlays to help technicians be more aware of the technical requirements of maintenance procedures. Virtual reality will enable technicians to practise dismantling and assembling train parts repeatedly, allowing them to be more familiar with the process.



Better commuter experience

As part of our move towards a Smart Nation, we are also leveraging technology to serve commuters better.

Travelling on public transport will become more convenient and fuss-free. We are trialling some initiatives such as account-based ticketing which will save commuters the hassle of topping up their travel cards; and hands-free ticketing for persons with disabilities so that it is easier for them to go through the stations' gantries without the need to tap their travel cards.

We have also launched a new version of the MyTransport.sg mobile application to make travelling on public transport more seamless. A revamp of our One Motoring website to make it more user friendly is also underway.

Working as one team, to strive for the better

We have been working tirelessly to improve our systems and services on all fronts. This can only be done with the support of our public transport staff. They work quietly behind the scenes and around the clock to raise the reliability of public transport, to ensure bus and rail services run efficiently, and that our land transport is safe for all.

It is the reason why a key part of the Land Transport Industry Transformation Map focuses on upgrading the skills of our transport workers to ensure they keep up with developments in the transport landscape.

Our most valuable asset is our people. We are committed to work together with our partners, public transport operators and staff to bring our land transport system to greater heights. Together, we will build a transport system that is ready for the future.

Ngien Hoon Ping
Chief Executive

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- Partner, Rajah & Tann Singapore LLP



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- Chief Executive Officer, Infocomm Media Development Authority



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- Director, Workplace Safety & Health, NTUC
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- Executive Secretary, United Workers of Electronics & Electrical Industries

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L-R

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Corporate

Chua Chong Kheng
Deputy Chief Executive
Infrastructure & Development

Jeremy Yap
Deputy Chief Executive
Public Transport, Policy & Planning

Ngien Hoon Ping
Chief Executive



L-R

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Engineering

Leong Kwok Weng
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Systems

Paul Fok
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Infrastructure Design &
Engineering

Sim Wee Meng
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Group Director
Rail Infrastructure and
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Ng Kee Nam
Group Director
Thomson-East Coast & Cross
Island Lines (Civil)

Wong Wai Keong
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Rail Asset, Operations
& Maintenance



L-R

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Road & Traffic

Chandrasekar
Group Director
Traffic & Road Operations

Yap Boon Leong
Group Director
*Road & Commuter
Infrastructure Development*

Lew Yii Der
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Frederick Wong
Chief Advisor
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Lam Wee Shann
Group Director
Technology & Industry
Development

ORGANISATION STRUCTURE





BLUEPRINT FOR THE FUTURE



It is past midnight and about 30m underground, or 10-storey deep, a Land Transport Authority (LTA) engineer is flying a drone in the MRT tunnel.

He is out of sight. Only a few minutes ago, the last train of the night had departed from the station, whisking commuters home after a day of activities. Rail maintenance work is now underway. With a console in his hand, the engineer sets the drone down at his feet on the tracks. It leaps up from the ground, sets off and soars into the tunnel.

With his deft fingers, the engineer controls the drone's direction, angle and speed of flight as it navigates high and hard-to-access places. The aim: to detect any cracks on the tunnel ceiling and walls. Then, the data is collected, and later analysed to see if things need fixing before any faults occur.

Here is a scene from the future of transport. A few years ago, this would be unimaginable – that drone technology would be used for rail maintenance, and transport workers had to learn the skill of flying drones.

Yet, these changes are happening at quantum speed all over the world.

In Dubai, autonomous flying taxis are taking to the skies. In Helsinki, autonomous buses are rolled out on public roads. In Las Vegas, smart cars communicate with traffic lights so drivers know exactly when the light will change colour.

Transportation is only going to get smarter. The speed at which technology changes the way we live, work and travel is exhilarating, and the land transport industry is ready to ride the wave.

Here at LTA, we are taking big strides towards the future of transport. It starts with a plan – an industry transformation map – and new technology.



FAST FORWARD



The drone hovers at a corner of the tunnel. Through the camera, the engineer spots unusual discolouration on the wall. He records it for further analysis. The LTA engineer of tomorrow is well-trained in data analytics – a crucial skill.

This training is already in the works. An Industry Transformation Map (ITM) was launched this year, outlining ambitious plans to grow and transform the transport industry into one that is enabled by technology and a highly competent workforce.

One part of the ITM is the Public Transport Skills Framework, which identifies the skills transport workers need to stay employable and relevant in the sector, along with career pathways and training opportunities. Among these are future skills in data analytics,

Internet of Things and project management for complex systems.

The Skills Framework for Public Transport details the skillsets and capabilities in various transport roles.

Together with the industry, unions and training providers, it provides a clear path on what workers need to acquire to progress in their careers in this industry, and what they might need to move to another track.

For new entrants, it is a practical framework to guide them on what is applicable in the workplace.

The ITM also plans to add up to 8,000 new public transport jobs by 2030 to support an expanding transport network. The backbone to support this expansion is the Singapore Rail Academy and the Singapore Bus Academy – two new training academies, which will up-skill and re-skill transport workers in this new digital era. LTA will also set aside \$25 million for mobility-related research and technology trials over the next five years. This would spur innovation and collaborative projects with industry partners, playing an integral part in shaping the transport of tomorrow.

The Land Transport Industry Transformation Map (ITM) at a glance

An innovative transport industry of tomorrow, enabled by technology and a highly competent workforce.



About **\$25 million**

will be set aside over five years for research and trials.



21,000 workers

in the bus and rail industry, and the sector is set to grow.

By 2030, up to **8,000 new jobs**

will be created.



Up-skilling and re-skilling workers

at Institutes of Higher Learning like the Singapore Bus Academy and Singapore Rail Academy, with programmes such as Career On-boarding for Railway Engineering (CORE).

Under the Public Transport Skills Framework, a total of **87 job roles**

have been identified along four career tracks: rail operations, rail engineering, bus operations and bus fleet engineering.



RIDE THE TECH WAVE

It is close to the break of dawn, and as the engineer wraps up his night, the stations will open and commuters prepare to start their day. Many of us are familiar with the new digital technologies that were implemented in the past year, which have become part of our commute.



Account-Based Ticketing

Like clockwork, commuters tap in and out from the fare gates, uninhibited and without the hassle of having to top-up at the machines or fumble over cash and coins to pay the exact fare.

This is due to Account-Based Ticketing (ABT), a technology which was piloted in 2017. It enables commuters to enjoy the convenience of tapping their existing MasterCard contactless credit and debit cards to pay for train and bus journeys.

ABT is freeing up time in many areas. One, the physical machines

for cash top-up are not congested with commuters as they do not need to top-up their fare cards and two, station staff are not overwhelmed with top-up requests, so they can focus on their core duties.



Hands-Free Fare Gates

Moving ahead, commuters may even pay without having to tap their cards at all. They will soon be able to use hands-free technology to pay their fares, as the trial of hands-free fare gates began in June 2018 at MRT stations. As commuters walk through the fare gates, it may be able to read a card or phone that is in their pockets or connected to Bluetooth on their mobile phones. The hands-free technology will

benefit persons with disabilities, making public transport more inclusive for all.



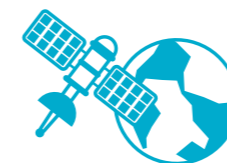
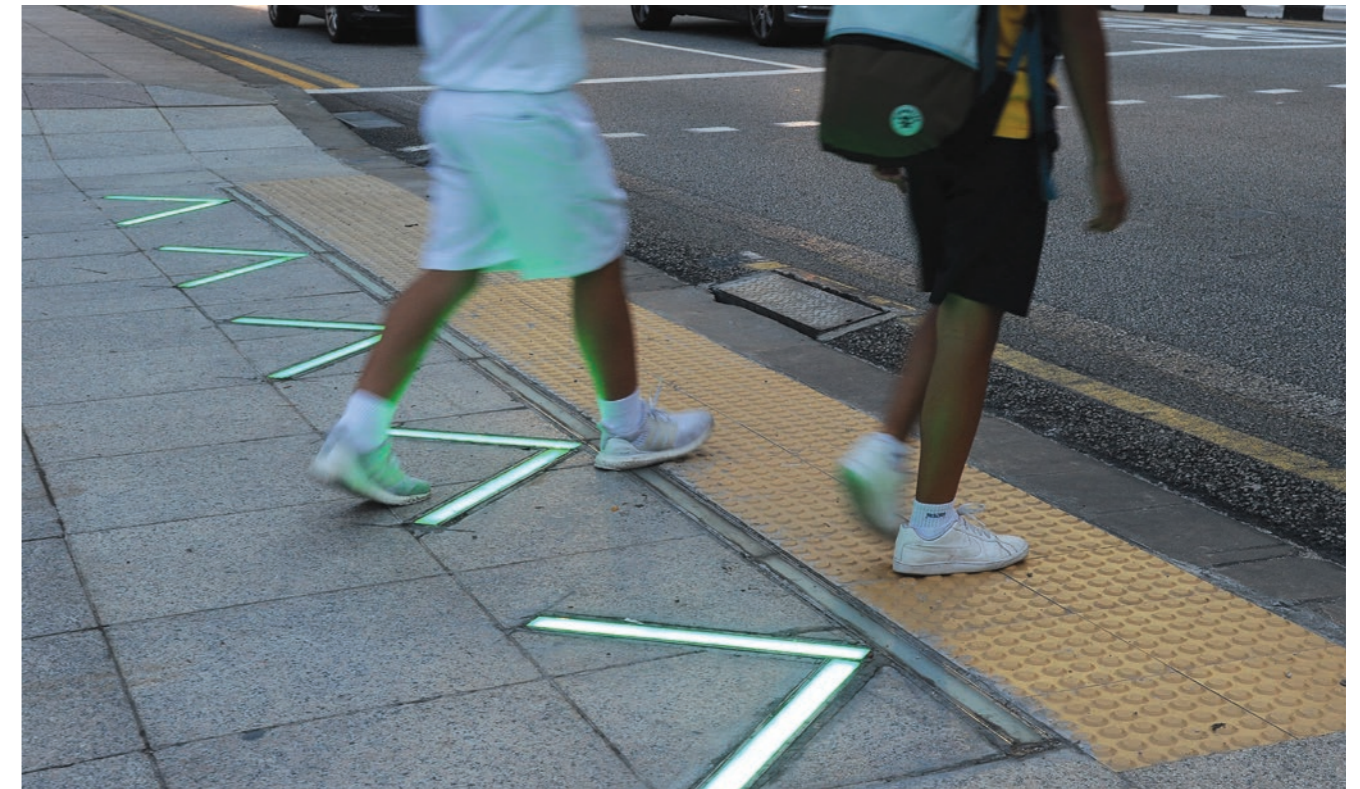
On-Demand Transport

Imagine being able to request pick-ups and drop-offs at any bus stop, or summon driverless shuttles at your fingertips. Such customised services could be available in future. In fact, trials are underway to conduct modelling, simulation, test and calibrate software and hardware solutions required to roll out dynamically-routed bus services by end of 2018. This will not only deliver better services to commuters, but also better deploy buses during off-peak periods.



ROAD INNOVATIONS

New innovative technologies represent the future of our road transportation system. We have implemented new features to better ensure safety and are testing new technologies to improve traffic management.



Future Traffic Management Systems

Congestion-free roads in the future can be possible with the adoption of Global Navigation Satellite System (GNSS) technology to enhance our traffic management capabilities.

Augmentation technologies such as Dedicated Short Range Communications (DSRC) beacons can further enhance positioning accuracy, and Automatic Number Plate Recognition (ANPR) cameras are able to help authorities with enforcement.

The best part? These technologies do not need heavy physical infrastructure as they can be mounted on existing overhead bridges, gantry signs or lamp posts.



LED Strips at Pedestrian Crossings

Colour-coded floor lights at pedestrian crossings are tested at traffic junctions with heavy footfall, namely Buyong Road, Victoria Street, Bencoolen Street and St Andrew's Road. It is a new feature that was first introduced in May 2017 as part of a trial.

The light strip on the ground flashes green or red in tandem with the traffic crossing signal, alerting pedestrians to focus their attention on the traffic light signal when they cross the road.

While the initial target audience is distracted pedestrians, it also benefits persons with disabilities (PWDs). For instance, those using a wheelchair may have their line of sight blocked by the crowd of people standing in front. The LED traffic light strip on the ground is another way for pedestrians to see the traffic light.




Smart LED Street Lights

Wave goodbye to orange-casted sodium street lamps. More than 95,000 energy-efficient LED lamps with brighter and better light will replace their dimmer predecessors.

What's more, the lamp posts will be able to diagnose itself in the event of a breakdown and send a notification to the maintenance crew.



Enhancing our digital platforms

Good news if you are a frequent user of the MyTransport.SG mobile application (MTM)! A new version of MTM has been launched to make travelling on public transport more seamless. Public transport commuters will be able to customise alerts and add their favourite locations. Drivers will now be able to see parking availability in the vicinity as well as personalise their app to view traffic cameras along their frequent routes. We will also be revamping our One Motoring website to make it more user friendly.



Our public transport system serves millions of commuters every day, and the time is now to begin a new chapter in the future of transport!



13.6
KM/H

17:30 MON
SEPT 6

72°
FAHRENHEIT

TURN LEFT
100M

TRACK CHANGES

02

Each day, thousands of people move in and out of the train stations. For many of them, the rail network is an essential part of their daily commute and their train journeys mark the start and end of their day. And it will remain so, as the rail system and infrastructure get renewed and upgraded.

The next generation of rail network will offer commuters more comfort and convenience. With new train lines, upgraded systems and extended networks, rail reliability will continue to improve, as trains run longer distances without experiencing downtime. LTA will also tap on technology and data to enhance maintenance and service levels, to make riding trains a breezy experience for commuters.

SMOOTHER RIDES



Trains are travelling further before delays lasting more than five minutes occur. This means rail reliability, measured by an international benchmark called Mean Kilometre Between Failure (MKBF), has improved. The higher the number, the better.

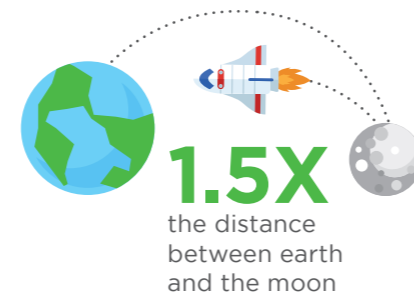
The MKBF for the overall MRT network rose from 390,000 train-km in 2017, to 574,000 train-km in the first half of 2018. This far exceeded the year's target of 400,000 train-km. In other words, trains travelled 574,000 km - 1.5 times the distance between the earth and the moon - before a downtime!

LRT systems also did well, achieving 77,000 car-km in 2017 and 64,000 car-km in first half of 2018.

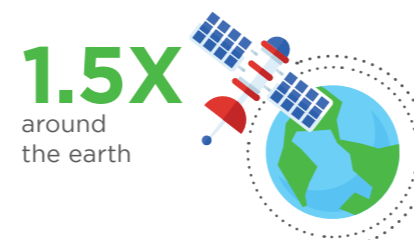
The increase in MRT reliability was achieved through a host of initiatives - from overhauling the infrastructure, improving maintenance procedures to streamlining its incident recovery processes. The goal is to shoot for 1,000,000 train-km by 2020 for the MRT network.

MKBF (1H 2018):

- MRT: 574,000 km*



- LRT: 64,000 km*



*Mean Distance Travelled between Delays > 5 min

TRACK UPDATES

The NSEWL may be the two oldest rail lines in Singapore, but by upgrading and replacing their infrastructure, they will soon be functioning like new networks. A host of other rail renewal projects was also carried out, from track upgrades to new trains.

Rapid renewal

We have completed the replacement of sleepers and third rail in 2016 and 2017 respectively. With the 'Early Closure and Late Opening' (ECLO) initiative that was introduced in December 2017, we have accelerated

the resignalling of NSEWL. NSL has switched over to the new signalling system, and the EWL has been using it for daily passenger service since May 2018. The installation of noise barriers between Dover and

Boon Lay stations, Kembangan and Eunos stations, and Simei and Tampines stations was roughly 1.5 times faster than the usual pace. That's some efficient upgrading!



New trains

By 2019, a total of 99 new trains will be added to the NSEWL, Circle Line (CCL) and North East Line (NEL).

At the same time, 66 first-generation trains on the NSEWL, which have been in service for more than 30 years, will also be retired progressively. LTA awarded the contract to have them replaced with new trains in 2018. These trains are expected to enter passenger service from 2021, completing the renewal of the NSEWL train fleet.

For the NEL, six new trains will be added to its fleet, while the CCL will get 11. All the trains are supplied by French firm Alstom. The trains, which will begin operations in 2023 and 2025 respectively, will be equipped with condition monitoring systems to allow for predictive maintenance, and sensors to detect dislodgement of the

devices. Two trains will also be fitted with an Automatic Track Inspection (ATI) System, which monitor, among other things, the track sleepers while the trains are in operation.



Welcoming the arrival of the new Thomson-East Coast Line (TEL) trains in 2018. They will undergo testing to prepare for the opening of the TEL next year.

Power supply, track circuit systems upgrade

An overhaul of NSEWL's power supply and track circuit systems is on the cards. The rail line will be equipped with features that reduce power-related faults and facilitate speedier recovery from signalling system failures. Starting in end 2018, it will be completed in early 2020s.

The new power system will switch between power supply sources automatically during a power outage, and comes with a Voltage Limiting Device-Fault Identification System that isolates power faults to specific stretches. Through a Supervisory Control and Data Acquisition

(SCADA) system, real-time monitoring of the power supply system will also be possible. Meanwhile, the new track circuit system will locate where trains are during a signalling failure, detect broken rails and pre-empt track circuit failures.

REFRESHING THE LRT

More comfortable journeys await commuters on board the upgraded LRT lines that connect them to MRT stations.

Sengkang-Punggol LRT

Barrier-free access, children- and elderly-friendly dual-speed escalators, and an additional lift. These are upgrades that commuters can look forward to at the Sengkang MRT and LRT stations from 2022. The current LRT platform will also be made more spacious for commuters.

Meanwhile, the Sengkang-Punggol LRT (SPLRT) line's power rail and its assemblies will also be renewed, while maintenance will be carried out on the signalling switch machines and cables.

In addition, the system's viaduct bearings will also be replaced, and crossheads that give viaducts support strengthened. This will be aided by loop closures that will provide additional engineering hours. These upgrades will be ready by 2020.



Bukit Panjang LRT

After 20 years of tireless service, the Bukit Panjang LRT (BPLRT) is undergoing its first major revamp that will span six years. Its trains, tracks and signalling system will be upgraded by Bombardier (Singapore), which will also provide long-term maintenance support.

The overhaul will see 19 Light Rapid Vehicles (LRVs) replaced and others upgraded. The trains will also be equipped with new Communications-Based Train Control (CBTC) signalling system by 2022. It will allow the precise location, speed and condition of trains to be tracked, and provide for better control of train acceleration and braking.

The BPLRT's power rail will also come with real-time monitoring capabilities that will keep an eye on rail alignment. Also keeping train faults at bay will be smart sensors across the system. All these will be completed by 2024. Stay tuned!

LOOKING LONG-TERM

To ensure upgrades made to the rail system go the distance, changes were made to how the train network is financed. This will allow for more timely enhancements to cope with increased commuter demand, better operations and maintenance.

New Rail Financing Framework

Over 60,000 of rail operator SMRT's assets, such as the trains and signalling systems, were transferred to LTA in October 2016 under the New Rail Financing Framework (NRFF). These included the NSEWL, CCL and BPLRT. First to go under the NRFF was the Downtown Line (DTL) in 2011.

On 1 April 2018, SBST's NEL and SPLRT also transited to the NRFF, completing the transfer of the entire rail system. Commuters can expect better rail reliability as the government is able to make timely procurement of additional trains and operating assets to keep pace with increases in ridership. Meanwhile, rail operators can focus on their core role – operating and maintaining the network.

New colours

The first 12 new trains bearing the new red and green livery were delivered to Jurong Port in October 2017, with the rest of the NSEWL new trains arriving by end-2018.



The red and green represent the two lines they will be operating on: red for the NSL, and green for the EWL. They also signify LTA's ownership of the trains under the NRFF, where the Government owns all rail assets. The train fleets were previously owned by the operators.

FUTURE FORESIGHT

The next-generation trains will improve rail reliability through the harnessing of technology and data – from tech tools that offer the power of foresight to detect defects before they occur, to a new signalling system that allows trains to arrive closer to each other, easing congestion on platforms.



Predictive maintenance

Imagine being able to detect impending faults and fixing them before they occur, spelling the end of train delays. To get there, the new power system and 66 new trains on the NSEWL will be equipped with real-time condition monitoring sensors. These instruments monitor, for instance, the temperature of the switchgear panel – where heating is often an indication of failure – to detect anomalies early.

As a start, the DTL pioneered a new-generation Automatic Track Inspection System. The undercarriages of four trains were fitted with imaging sensors and laser scanners to monitor track conditions. This technology will soon be rolled out to the other rail lines.

Giving track inspections a further boost are drones and all-terrain vehicles that never tire.

Soon, problems such as cracks or water leaks will no longer be detected by workers manually combing the tunnels. Instead, unmanned aircrafts and robots with 360-degree video mapping capabilities will detect defects from the video taken and even pinpoint their locations.

New trainee technicians will also get to hone their skills in dismantling and assembling huge and complicated railway

components like the train bogie – the structure underneath a train to which axles and wheels are attached – or the train carbody, through guided lessons that make use of virtual reality technology. This allows them to practice more often than previously possible. The method is on trial at the Tuas West depot in 2018.

Tying everything together is a Rail Enterprise Asset Management System (REAMS), which will consolidate and integrate information collected from all train lines into one place. LTA has awarded a tender for the system, which enables information collected through sensors and maintenance tools to be distilled into valuable data that can be used to better plan maintenance and renewal works, to be implemented on the DTL. The system will eventually be rolled out to the other rail lines.

BETTER CONNECTIONS

The backbone of Singapore's land transport system is a well-connected rail network that is capable of supporting ever-growing commuter demand. To make it more convenient for commuters, eight in 10 households will be within a 10-minute walk of a train station with the opening of new lines – about 130km of track – by 2030.



2017 Tuas West Extension

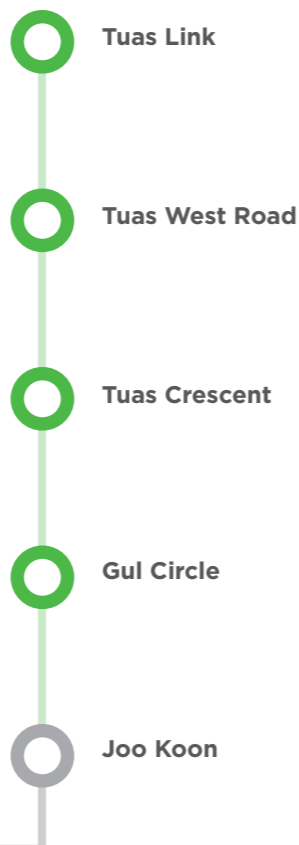
Everyone knows how precious time is. For those who work in Tuas, their rail commute has been shortened by 35 minutes! The time-saver credit goes to the four new stations on the Tuas West Extension (TWE), namely, Gul Circle, Tuas Crescent, Tuas West Road and Tuas Link stations, which significantly sped up their commute from home to Tuas.

Time Saved

Ang Mo Kio ► Tuas West Road

Before:
100 mins
Via NSL > EWL > Bus

After:
65 mins
Via NSL > EWL



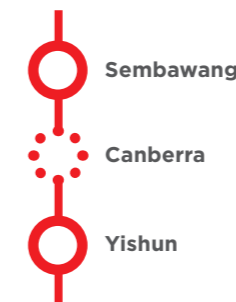
2017 Downtown Line 3

Comprising 16 stations along 21km of railway, DTL3 is the longest stretch of the DTL to be opened. It includes three interchanges with links to the CCL and EWL, making it easier to travel from the eastern part of the island to the Central Business District (CBD) and Marina Bay areas.



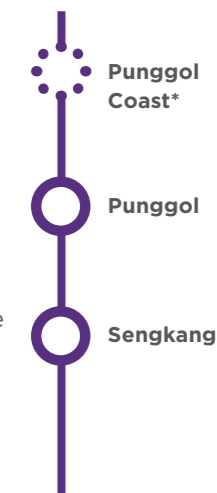
2019 Canberra Station

The NSL will get a new stop in 2019. This could save commuters about 10 minutes in travelling time as they no longer need to take the bus to Yishun or Sembawang stations.



2023 North East Line Extension

Come 2023, Punggol will no longer be the last station on the NEL. By then, the one-station North East Line Extension will be completed with the addition of Punggol Coast station. The new station will serve residents in the Punggol North area, giving them easy access to the city.



*Note: Station names are working names only

2019 - 2024

Thomson-East Coast Line

Singapore's sixth MRT line is on track to be completed by 2024. In total, the TEL will have 31 stations, comprising six interchanges which connect to all five of our current rail lines. Not only will it make travelling to the city and the north much faster, the TEL will also give residents living in Tanjong Rhu through to Marine Parade, Siglap and Bayshore the option of taking the train. These residential areas are currently not served by the rail system.

Phase 1 of the TEL, comprising Woodlands North, Woodlands and Woodlands South stations, is in its final stages of construction and will open in 2019. Progress has also been made on other parts of the line such as tunnelling works for the second phase of the project - from Springleaf to Caldecott stations and the foundation of a 36ha East Coast Integrated Depot.

Roughly the size of 60 football fields, the integrated depot will house three train depots and a bus depot when completed in 2024.

Studies are also being conducted to assess if the TEL could be extended from its last eastern stop at Sungei Bedok station to the Changi Airport MRT station that currently serves Terminals 1 to 4, and even to Terminal 5 (T5). If it happens, the extension is expected to begin operation in tandem with T5.



Time Saved

East Coast Park ▶ Orchard

Before: **75 mins**
Via Bus
After: **45 mins**
Via TEL

Marine Parade ▶ Shenton Way

Before: **40 mins**
Via Bus > EWL
After: **20 mins**
Via TEL

2026 - 2028

Jurong Region Line

Once thought of as a far-flung corner of Singapore, Jurong is rapidly becoming an attractive place to work, live, learn and play. To complete its transition is the seventh MRT line - Jurong Region Line (JRL) that will be constructed in three phases. It will have 24 stations, serving residents living in Choa Chu Kang, Boon Lay, Jurong, future developments in the Tengah area, as well as the Jurong Lake District. It will also connect commuters from around the island to the Jurong Industrial Estate and the Nanyang Technological University (NTU). The JRL is expected to ferry more than 500,000 commuters daily. Say hello to Singapore's western business district!

2026: JRL (West)

- Choa Chu Kang
- Choa Chu Kang West*
- Tengah*
- Hong Kah*
- Corporation*
- Jurong West*
- Bahar Junction*
- Boon Lay
- Gek Poh*
- Tawas*

2027: JRL (East)

- Tengah*
- Tengah Plantation*
- Tengah Park*
- Bukit Batok West*
- Toh Guan*
- Jurong East
- Jurong Town Hall*
- Pandan Reservoir*

2028: JRL

- Nanyang Gateway*
- Nanyang Crescent*
- Peng Kang Hill*
- Enterprise*
- Tukang*
- Jurong Hill*
- Jurong Pier*



*Note: Station names are working names only

Time Saved

Choa Chu Kang ▶ Lee Wee Nam Library in NTU

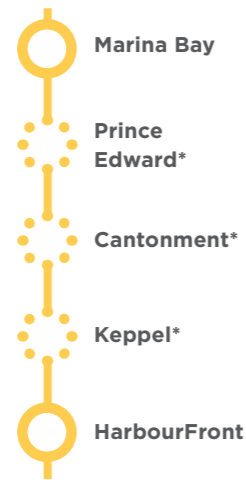
Before: **60 mins**
Via NSL > EWL > Bus
After: **35 mins**
Via JRL

Woodlands ▶ Jurong Island Checkpoint

Before: **80 mins**
Via NSL > EWL > Bus
After: **45 mins**
Via JRL

2025 Circle Line 6

Construction of the Circle Line's sixth phase (CCL6) has kicked off. When it is completed in 2025, three new stations – Keppel, Cantonment and Prince Edward – will close the loop by linking HarbourFront and Marina Bay stations. It will make travelling between areas in the west, like Pasir Panjang and Kent Ridge, and the Central Business District and the Marina Bay area a breeze.



*Note: Station names are working names only

~2030 Cross Island Line

Site investigations into two alignment options for the Cross Island Line – directly underneath or skirting round the Central Catchment Nature Reserve – were completed in 2017.

Phase 1 of the Environment Impact Assessment (EIA) process, completed in 2016, had evaluated the nature reserve's condition and ecosystem, and the environmental impact of site investigations. Phase 2 of the EIA process, which assesses the impact of the construction and operation of the CRL in the long run, is ongoing. Its results will be studied and discussed before a final decision is made on the alignment.



Beyond the Causeway

Getting from Woodlands to Johor Bahru in Malaysia will be faster in future, with the Johor Bahru-Singapore Rapid Transit System (RTS) Link. The RTS Link journey between Woodlands North and Bukit Chagar stations will only take 5 minutes, as compared to about 20 to 30 minutes by car and bus – if there is no traffic jam. The RTS Link will be able to ferry up to 10,000 commuters in each direction every hour.

MORE COMFORTABLE COMMUTE

Commuters can worry less about congested train platforms and packed cabins during the morning and evening peaks. New crowd-monitoring systems will tell commuters which cabins are emptier, and allow train operators to react more quickly to overcrowding on platforms.

Keeping passengers informed

Red, amber and green are not merely traffic light colours. Making an appearance on the DTL platform LCD screens as the new Passenger Load Information System, the colours inform commuters how crowded a cabin is – green indicates that they have a high chance of getting a seat, amber means there is only standing room, and red is a warning that even standing might be a squeeze. With such colour-coded notifications, you will always know which cabin to board during peak hour traffic!



Fusion Analytics for Public Transport Emergency Response (FASTER)

FASTER is an advanced analytics system that provides early warning on potential train incidents for timely intervention. Using novel fusion analytics on multiple data sources such as WiFi, cellular and anonymous EZ-Link cards, its predictive capabilities provide comprehensive situational awareness to aid swift decision making during incidents. This reduces impact to commuters. By analysing past incidents, FASTER also enhances planning and resource optimisation such as adapting bus-bridging services to meet commuter demands to improve journey times during incidents.



▶ BUS NO 02	▶ BUS NO 02
▶ BUS NO 03	▶ BUS NO 03
▶ BUS NO 04	▶ BUS NO 04
▶ BUS NO 05	▶ BUS NO 05
▶ BUS NO 06	▶ BUS NO 06
▶ BUS NO 07	▶ BUS NO 07
▶ BUS NO 08	▶ BUS NO 08
▶ BUS NO 09	▶ BUS NO 09
▶ BUS NO 10	▶ BUS NO 10
▶ BUS NO 11	▶ BUS NO 11
▶ BUS NO 12	▶ BUS NO 12
▶ BUS NO 13	▶ BUS NO 13

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TUESDAY 28°C 32°C

WEDNESDAY 30°C SATURDAY 29°C

THURSDAY 31°C SUNDAY 28°C

BUSSING TO NEW HEIGHTS

03

Bigger fleet, new routes, better terminals. Check, check and check. There's much to look forward to when riding the public buses these days.

These three major changes strengthen the public transport network, and are a boost to our public buses.

For commuters, such enhancements are upgrades to their daily bus rides. And there's more to come, as work is in progress for on-demand buses and electric buses. Instead of flagging down a bus at a bus stop, commuters may soon be able to request for a bus ride via a mobile app, then head to a designated point to wait for their high-tech ride.



BUS SERVICE ENHANCEMENT PROGRAMME (BSEP)

Some of us may have noticed more bus services plying the roads. That's because the \$1.1 billion Bus Service Enhancement Programme (BSEP) added 80 bus services and 1,000 new buses. The final 1,000th bus went on the road in December 2017.

As part of the BSEP, new routes have been added to improve the public transport experience, especially for residents living in newer estates. The BSEP is a five-year initiative that started in 2012 to expand bus capacity and provide better connectivity.



1,000 Buses added

to the roads under the \$1.1 billion five-year Bus Service Enhancement Programme.



10 Minutes shorter waiting time during peak period as maximum scheduled headways are reduced from 30 mins to 20 mins.

BUS CONTRACTING MODEL (BCM)

Today, we have four public bus operators - Go-Ahead Singapore, SBS Transit, SMRT Buses and Tower Transit Singapore. The two new bus operators (Tower Transit Singapore and Go-Ahead Singapore) were brought into the industry with the transition to the Bus Contracting Model (BCM) in September 2016. With the BCM, the Government owns all depots and buses, and retains fare revenue, while bus routes are open to competitive bidding in packages. The two latest bus packages, namely Seletar and Bukit Merah, were awarded to SBS Transit.

In addition to allowing LTA to plan bus services centrally and set bus service standards, the BCM model

also encourages competition among multiple operators. The pressure is on the operators to ensure that their operations are efficient and well run. It also encourages bus operators to step up their recruitment, staff training, upgrading and professionalise the bus workforce, making bus careers more attractive.

Bus services under the BCM have also become more responsive to changes in ridership and commuter needs. With 96 more buses and 15 new services added as of 2017, commuters now enjoy more comfortable rides and more regular bus arrivals. In fact, a year after BCM started, 75 per cent of the bus services have become less crowded during peak hours.



4 Public bus operators now,

namely Go-Ahead Singapore, SBS Transit, SMRT Buses and Tower Transit Singapore.

96

More buses added as of 2017

15

New services added as of 2017



BUS INFRASTRUCTURE ENHANCEMENTS

Our bus facilities are upgraded frequently to better serve the needs of commuters. This includes constructing new bus interchanges, upgrading existing ones and refurbishing the facilities at older interchanges.



Kampong Bahru Bus Terminal

Replacing the existing New Bridge Road bus terminal, it has barrier-free sheltered boarding and alighting facilities, as well as barrier-free toilets to better cater to the needs of the elderly, less mobile and families with young children.



New Tuas Terminal

Opened in October 2017, the terminal is equipped with two alighting berths and one bus-stop style boarding berth to accommodate boarding and alighting activities. It also features a priority queue zone and barrier-free toilets to better cater to the needs of the elderly and less mobile. There are enhanced facilities too for bus captains and staff, including dedicated staff toilets and a staff lounge.

Bukit Panjang Integrated Transport Hub (ITH)

Bukit Panjang is the ninth completed ITH in Singapore, which opened in September 2017. Commuters now enjoy seamless transfers between the new air-conditioned bus interchange, the Bukit Panjang MRT and LRT stations, and Hillion Mall.

Shenton Way Bus Terminal

Commuters travelling to the CBD are benefiting from upgraded facilities at the new Shenton Way bus terminal, which opened in June 2017. It features a priority queue zone, barrier-free toilets as well as 150 bicycle lots.

With new technology and upgraded facilities, bus journeys are now more comfortable and convenient. Let's hop on and journey together to the next stop!

Seletar Bus Depot

The new bus depot in Seletar opened in January 2018, as SBS Transit expands its bus service network in Ang Mo Kio and Yishun. Among its amenities are a gym, a rest area with deck chairs, and an air-conditioned canteen with cashless payment options for the staff.



BETTER BUSES

Many of us connect to major transportation nodes with buses, as they complement the MRT system and bring us closer to our destinations. Our buses strive to be safe, predictable and timely for this transport integration to be efficient.

Today, technological changes are giving us more control and comfort on our bus journeys.

Hybrid, Electric Buses

More electric and hybrid buses are plying the roads, as part of Singapore's push towards a more environmentally-friendly transport system. LTA is expanding its trial of hybrid and electric buses. A tender was called to purchase 50 hybrid buses and 60 electric buses in 2017 and 50 diesel hybrid buses are expected to hit the roads in the second half of 2018.

Journeys on these green vehicles are quieter and more fuel efficient! Preliminary results suggest fuel cost savings of up to 30 per cent compared with conventional diesel buses.

Common Fleet Management System (CFMS)

Since end 2017, all public buses are equipped with the common fleet management system (CFMS), a sophisticated system that allows bus operators to track bus fleets in real-time. It monitors bus movement and shows the time that a driver needs to reach certain bus stops, so buses are on schedule for commuters.

This translates to better journey planning for commuters, who can check accurate bus timings on their MyTransport app, for instance. At our fingertips are information like the estimated arrival time and capacity of buses.

On-Demand, Dynamically Routed Public Buses

Soon, commuters will be able to enjoy the convenience of on-demand dynamically routed public bus services. This means commuters could request via a mobile application for pick-ups and drop-offs at any bus stop within an operating area, instead of relying on fixed timetables or routes. In the first phase of the trial, a dynamic matching and routing algorithm will be developed to enable buses to be deployed according to real-time commuter demand, as well as pick-up and drop-off points.





MOBILITY REDEFINED

MONDAY
SEPT 01 30°C

TUESDAY	28°C	FRIDAY	32°C
WEDNESDAY	30°C	SATURDAY	29°C
THURSDAY	33°C	SUNDAY	28°C

BLOCK 7241

BLOCK 7242

BLOCK 7243

04



Zip to the next town in a jiffy riding an e-bike or e-scooter on a cycling path, or brisk-walk to the nearest train station. Walking, cycling, or the use of personal mobility devices offer commuters more choices for first-mile and last-mile connectivity – taking you from your home to your destination conveniently.

In reshaping the future of point-to-point transport, we have also been exploring new on-demand mobility solutions to make commuting by road more convenient. Autonomous vehicles, on-demand shuttles, and an island-wide electric vehicle car-sharing programme – these solutions that are currently undergoing trials will pave the way for a car-lite future.

More than 12% of Singapore's total land area is taken up by roads. Given our land constraints and competing needs, it is not sustainable to continue expanding the road network. The long-term solution is to encourage people to reduce their reliance on cars and look to the public transport system, shared transport or other transport options as their preferred mode of travel. Apart from building the infrastructure to make it easier to use these new modes of transport, we are also putting in place rules and regulations to make it safer and more enjoyable for everyone to walk, cycle and ride.

A SAFER RIDE

While e-bikes and e-scooters are slower than cars, they are still fast enough to be hazardous to pedestrians and other users. Here are some ways to enhance safety on roads.

Practical Education

Are you a safe cyclist or e-scooter rider? Pick up essential safe-riding tips on a fun-filled training circuit and learn more about the Active Mobility Act through the 90-minute Safe Riding Programme (SRP). Open to the public since February this year, the SRP creates greater awareness of safe riding for both cyclists and PMD riders. The four-module workshop covers equipment and pre-journey preparation, skills training, infrastructure familiarisation, and rules and code of conduct.

Active Mobility Act

The Active Mobility Act (AMA) regulates the sale and use of bicycles and personal mobility devices (PMDs) such as e-scooters on public paths. The Act also regulates where bicycles, PMDs and power-assisted bicycles (PABs) can be used and how fast they can go. This new law is the result of collaborative efforts by the Active Mobility Advisory Panel, which recommended a comprehensive set of rules and code of conduct to safeguard public path users, especially the more vulnerable pedestrians.

They include specifications such as weight and speed limits of PMDs, as well as rules governing their use on public paths. For instance, riders must dismount and push at 'No Riding' zones, switch on front and rear lights when dark, and extend help and provide their particulars when involved in an accident.

There are also regulations for retailers on the sale, advertisement and modification of non-compliant devices.

Stringent Penalties

Stiffer fines and penalties to deter errant users under the Road Traffic Act as well as the Active Mobility Act took effect from January and May this year respectively.

Device criteria for public path use



20kg
Max. weight

Reduces the risk of serious injuries in cases of collision



70cm
Max. width

Allows devices to cross each other safely



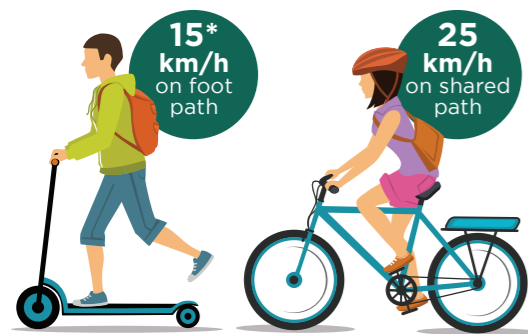
25km/h
Max. motorised device speed

Ensures users do not exceed the speed limit

Rules and Penalties when Riding on Paths

Keep within the speed limits

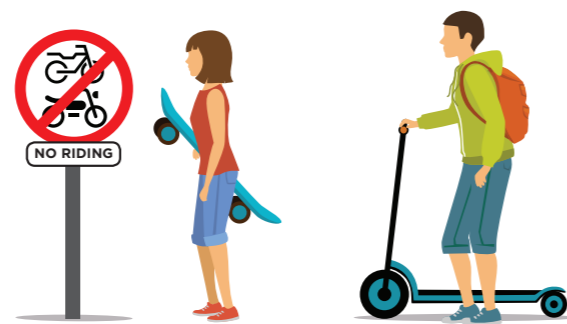
The speed limit will continue to be reviewed with safety in mind



*Will be lowered to 10km/h in early 2019

Maximum penalty \$2,000 fine 6 months jail term

Dismount and walk your device when you see 'No Riding' signs



Maximum penalty \$2,000 fine 6 months jail term

Switch on lights in the dark

Front white lights and rear red lights are a must. Rear red reflectors are accepted on bicycles and PABs



Maximum penalty \$2,000 fine 6 months jail term

Offer help and provide particulars

If you are involved in an accident which results in injury or property damage



Maximum penalty \$5,000 fine 2 years jail term

Do not ride recklessly on paths



Maximum penalty \$5,000 fine 6 months jail term



Registration of Power-Assisted Bicycle (e-bikes)

Starting 1 February (2018), power-assisted bicycle (PAB) owners must have their e-bikes registered and number-plated. This unique form of identification promotes responsible ridership, enhances enforcement action against reckless riding, and weeds out non-compliant PABs.

Registration of personal mobility devices (e-scooters)

Plans are also underway for e-scooters to undergo mandatory registration from early 2019 - a recommendation by the Active Mobility Advisory Panel to deter reckless riding.

Enhanced Active Mobility Patrol and Enforcement

Speedsters - be warned! Active Mobility Enforcement officers, equipped with speed guns, are catching cyclists and PMD users who exceed speed limits and are a danger to other users.

With the introduction of the speed gun in May, the enforcement officers are able to take a real-time measurement of how fast you are riding - up to a kilometre away.

In June, a month after the start of tougher rules, the officers caught about 300 errant active mobility device users.

Responsible Parking

A new licencing framework for bicycle-sharing companies aims to ensure responsible parking of shared bicycles. The Parking Places (Amendment) Bill was passed in March. Under the new law, the permissible fleet size of an operator is granted by the authorities based on how well it manages indiscriminate parking, subject to a six-monthly review.

In a combined effort to enhance enforcement action against inconsiderate parking, bike-sharing operators will also share with LTA the location of bicycles and the details of users who park indiscriminately. Users of shared bicycles will have to scan a quick response (QR) code located at designated parking areas before they will be able to end their journey, thereby ensuring that users park properly.

EXPANDING CYCLING INFRASTRUCTURE

Cycling infrastructure is a major component in improving connectivity, as it links cyclists to other transport nodes and beyond. Making cycling a viable alternative to other transport modes enhances first-mile and last-mile connectivity, and boosts our vision of going car-lite.

More Bicycle Parking Spaces

- Can't find a convenient place to park your bicycle? It will only get easier. From May, applications for new buildings and redevelopment projects will be required to provide more bicycle parking spaces with the updated bicycle parking standards - making our urban landscape friendlier to cyclists.
- Residential developments will have to provide at least one bicycle parking lot for every four or six units, depending on the location, while commercial developments will have to demarcate bicycle parking spaces based on floor area.
- Cyclists can also look forward to end-of-trip facilities, such as shower stalls, lockers and washrooms near the parking spaces with an incentive programme that encourages the provision of such facilities and more parking spaces.



A MORE WALKABLE CITY

Infrastructure is a major component in the future of new urban mobility, revolutionising the way we move seamlessly on our first and last-mile connections.

Lift Access to Pedestrian Overhead Bridges (POBs)

Lifts at POBs provide better accessibility to commuters, especially the elderly and disabled. LTA has been actively retrofitting POBs at transport nodes that are frequented by less mobile users, making it easier for pedestrians to use the elevated crossings.

Getting You Covered

Commuters can enjoy 200km of covered walkways by 2018, providing seamless access and a more comfortable walk to transport nodes - rain or shine.

Educational institutions, healthcare facilities and residential developments will be connected by sheltered walkways to MRT stations within a 400m radius, and LRT stations and bus interchanges within a 200m radius.

More Cycling Routes

13km
Bedok Cycling Network

Connecting residents between Chai Chee and Upper East Coast Road.

15km
Jurong Lake District Cycling Network

Connecting residents to transport nodes, amenities, and other developments around Jurong Lake District.

A total of

47 bridges

will be given lift-access by end of 2018, which will expand to 74 POBs by 2021.

A total of

88 MRT stations | **38** LRT stations | **1** bus interchange

will feature the covered walkways and way-finding signage as part of the Walk2Ride programme.



GO CAR-LITE

To turn our car-lite vision into reality, we are working on new technology such as autonomous vehicles and electric car-sharing schemes to offer greater commuting convenience.



Auto- nomous Vehicles

Fancy being shuttled around in a self-driving taxi or bus? At a touch of your fingertips, an autonomous vehicle (AV) can soon wheel over to your location on-demand.

Such autonomous shuttles can be dynamically routed to respond to real-time demand of commuters, providing a more responsive, efficient and convenient transport mode.

Successful trials

LTA has been supporting the development and testing of AV technology with four organisations at one-north since 2015.

With current trials making good progress, Singapore is ready for a future with AVs cruising our streets. In fact, Singapore was ranked second, just behind US, in terms of readiness for AVs.

These smart vehicles are set to transform how we travel within towns, and we are accelerating the AV push by exploring how these vehicles can be successfully implemented in future towns. A Request for Information (RFI) was issued in November 2017 to spearhead the pilot deployment of autonomous buses and shuttles in three locations.

Residents, workers and students in Punggol, Tengah and Jurong Innovation District can look forward to a better commute as autonomous scheduled buses and autonomous on-demand shuttles are set to be introduced from the early 2020s. The on-demand and scheduled self-driving services will enhance first and last-mile connectivity to other transport modes.



Through the study, we will be better equipped to design the infrastructure, organise services and formulate regulations to better deploy, scale-up, and facilitate the safe use of AVs in other parts of Singapore.

More test areas

The AV trial route was extended from 12km to 67km in June 2017. Previously covering only one-north, the expanded test areas now include National University of Singapore (NUS), Singapore Science Parks 1 and 2, Dover and Buona Vista. This will accelerate the testing of self-driving vehicles in the more dynamic traffic scenarios of mixed-use and residential areas, catalysing technology development and potential adoption.

Setting new standards

With no existing international testing standards for AV systems, the world is racing to develop the benchmarks. LTA teamed up with Enterprise Singapore (ESG) and the Centre of Excellence for Testing & Research of AVs - Nanyang Technological University (CETAN) to establish internationally recognised standards for the safe deployment of AVs on Singapore's roads.

The opening of CETAN's two-hectare AV Test Centre at the Jurong Innovation District in November 2017 is a step forward in providing the necessary facilities to test the security, operational, and functional safety of self-driving vehicles.

Boosting Research & Development

LTA signed a Memorandum of Understanding with Singapore University of Technology and Design in November 2017 to set up a fourth transport research centre. The centre will focus on building a future-ready transport system in areas of cybersecurity, automation, robotics, data analytics, behavioural studies and user-centric design in transport solutions.



Going Green with Electric Car Sharing

Drive a car without the need to own one. The first batch of 80 BlueSG cars successfully rolled out in December 2017 and made this possible.

Members can easily borrow a car from one of the 120 charging points located across 32 charging stations all over the island. And there will be more electric vehicles available for everyone – drivers

can look forward to 1,000 cars and 2,000 charging points at 500 charging stations nationwide by 2020.

Licensing of Private-Hire Cars

To enhance the safety of passengers as well as other road users, LTA implemented a mandatory PHC Driver's Vocational Licence (PDVL) scheme. It is similar to the Taxi Driver's Vocational Licence (TDVL).

In-Vehicle Recording Privacy

Taxi and PHCs can be equipped with inward-facing in-vehicle recording devices (IVRDs) to prevent fare evasion and abuse of drivers. To complement the Personal Data Protection Act (PDPA)'s advisory guidelines on their recordings, LTA published a set of installation guidelines that came into effect from 22 June 2018.

Drivers who wish to install these recording devices must obtain LTA's approval and installations can only be done at LTA-authorized installation centres. There will also be restricted access to the footage recorded by the IVRDs. For example, only Government agencies can review the footage to support investigation and enforcement efforts.



A WALK-CYCLE-RIDE FUTURE

Walk-Cycle-Ride SG is our aim to make walking, cycling and riding on public transport the preferred way to travel. The planned infrastructure projects to support this initiative bring us closer to achieving our car-lite vision.

North-South Corridor

In 2026, a new highway will cut the travelling time for those living in the north to the city. The 21.5km North-South Corridor (NSC) will be the first integrated transport corridor featuring continuous bus lanes and cycling routes to connect towns from the north to the city centre.

With express bus services plying the highway, commuters living in Woodlands, Sembawang, Yishun and Ang Mo Kio can look forward to reducing their travelling time. If you are planning to ride on your two-wheelers, cyclists can enjoy better connectivity between cycling networks and park

connectors within HDB towns. The first tender for the design and construction of a stretch of the corridor was awarded in late-2017, with the remaining tenders for the tunnel sections of the NSC to be awarded by end-2018.



Tengah: First Car-Free Town

Picture a town centre connected by just paths between your home and the nearby amenities such as food courts, community centres and the train station. At Tengah, Singapore's first car-free town centre, this vision is a reality.

Commuting will be easy in this western town, with public transport networks no further than 300m of residents' doorsteps, providing excellent connectivity to nearby MRT and key destinations such as the Jurong Lake District. Autonomous buses will also be piloted in the town. While there are no roads at ground level, the town centre – named 'The Market Place' – will still be accessible by



roads underground. This frees up valuable space on ground level for walking, cycling and other recreational activities. This exciting development, set to

be developed over 20 years, will feature underground crossings, dedicated bus lanes, shaded paths and rest-stops.

AWARDS 2017/18



BCA Green Mark for Rapid Transit System (RTS) Award (Gold Plus)

The Downtown Line (DTL) uses a suite of energy saving technologies in its operations to achieve a high level of energy efficiency, earning this outstanding award. For instance, DTL stations use energy-saving air-conditioning systems. The DTL also uses a regenerative braking system where energy produced by a train during braking is used to power a nearby train or train station. In addition, the rail line recycles condensate water collected from the air-conditioning system at DTL stations and uses it for the cooling tower. DTL stations are also built with ample bicycle parking lots and sheltered walkways, encouraging commuters to be active and lead a healthy and green lifestyle.

Singapore Concrete Institute (SCI) Excellence Awards 2017 (Builders Category)

This award recognises contractors' contributions to improving productivity in building and civil engineering projects. LTA won the award for being the first in Singapore to use a retractable micro tunnel boring machine to construct an underpass for the new Orchard Station on the Thomson-East Coast Line. The machine allowed tunnelling works to be carried out while still maintaining the internal inter-locking pipes system of the train station. This trenchless construction method meant that there were no disruptions to existing MRT operations.

International Tunnelling Association (ITA) Tunnelling Award 2017 - Technical Project Innovation of the Year

To construct a pedestrian underpass at Havelock Station on the Thomson-East Coast Line, LTA used a Rectangular Tunnel Boring Machine (RBTM), a first for Singapore. This allowed the underpass to be constructed in record time and less manpower, and with minimal disruptions to road and human traffic above ground. For this achievement, LTA was shortlisted as one of three finalists from multiple projects around the world for the Technical Project Innovation of the Year Award. The award, presented by the International Tunnelling Association, recognises the most ground-breaking achievements in underground infrastructure worldwide.

MOT Minister's Innovation Award (Distinguished)

LTA received this award for being the first in the world to integrate two processes - touch voltage detection and fault identification - into one system. This allowed rail faults and their locations to be detected quickly without disrupting train services. This award recognises innovative projects which contributed to the Ministry's mission and goal, resulted in benefits to the public and industry, and proved to be cost and time effective.

MOT Minister's Value for Money (VFM) Achievement Award (Distinguished)

LTA was recognised for its efforts in building a new bus terminal as well as an upcoming train station. Palmer Road Bus Terminal had to move to a new facility at Shenton Way to make way for the construction of Prince Edward Station on Circle Line 6, the last phase of the rail line that completes the loop. The same project team managed the construction of the new bus terminal and train station. This allowed the team to identify ways to cut construction costs, minimise disruptions to key stakeholders, reduce construction risk to the future MRT station, and enhance travel experience for commuters.

BCA Green Mark Platinum Award

The Kim Chuan Depot Extension (KCDE) adopts design strategies to ensure energy efficiency and the usage of sustainable products certified under the Singapore Green Labelled Scheme. The KCDE, which will expand the capacity of Kim Chuan Depot when the Circle Line 6 is completed, received the BCA Green Mark Platinum Award for its environmentally sustainable design that leads to at least 30% in energy savings.

AWARDS 2017/18

BCA Green Mark Platinum Award

The East Coast Integrated Depot (Rail Depot) received this award for its energy and water saving features. The depot has an energy efficient water-cooled chilled plant, a solar absorption chiller, and an energy efficient lighting system that improves lighting power budget by 40%. The depot's other features include the use of a rooftop solar photovoltaic system, MERV 14 air filter and UV light for air handling units, recycling and reusing of train wash water, and buildings designed with natural ventilation spaces.

Society of Rock Mechanics & Engineering Geology (SRMEG) Best Presentation Award 2018

This award recognises outstanding research and communications in the area of rock mechanics, rock engineering and engineering geology. LTA won the award for its presentation on controlled rock blasting of Bukit Timah granite for the construction of Napier and Havelock Stations, both underground stations on the Thomson-East Coast Line.

Project Management Institute Singapore Chapter Project of the Year 2017-18 Award - Engineering & Construction Category

This award recognises outstanding engineering and construction projects. LTA successfully used a retractable micro tunnel boring machine while still maintaining the internal inter-locking pipes system for trenchless construction of an underpass for Orchard Station on the Thomson-East Coast Line. For this achievement, it earned third place among numerous nominations from Singapore-based companies and Government agencies.

Project Management Institute Singapore Chapter Project of the Year 2017-18 Award - Engineering & Construction Category

This award is given to projects demonstrating outstanding standards in engineering and construction. The twin-mined tunnels for Caldecott Station on the Thomson-East Coast Line won second-place. This project is believed to be the first and biggest mined tunnel to be constructed in mixed-soil conditions in Singapore, using an innovative method that saves time and manpower as compared to the original cut-and-cover construction method.

BCA Construction Excellence Award 2018 Civil Engineering Category

The construction of Gul Circle Station and viaducts, as part of the Tuas West Extension project, won this prestigious award that is given only to projects with the highest standard of construction excellence in Singapore. The project included constructing rail viaducts above the Ayer Rajah Expressway and Pan Island Expressway, and constructing an elevated interchange station with many utilities and serving multiple stakeholders above the busy Tuas Road.

2017 Singapore's 100 Leading Graduate Employers, by GTI Media

Most Popular Graduate Employer 2017, Construction & Civil Engineering (Sector Finalist), by GTI Media

LTA was ranked as one of the leading employers among undergraduates and graduates in 2017, across all industries as well as in the construction and civil engineering sector.

SHARE Platinum Award and 15-Year Outstanding SHARE Award

These awards are presented to organisations and individuals who have donated significantly to Community Chest. This includes outright donations, as well as funds raised from events and contributions through SHARE, a monthly giving programme of the Community Chest.



CONTRACTS AWARDED IN FY17/18

THOMSON-EAST COAST LINE

CONTRACT NO	CONTRACTOR	DESCRIPTION
T200	SMRT Trains Ltd	Thomson-East Coast Line Operator
T256A	ST Engineering Electronics Ltd	Maintenance Management System for Thomson-East Coast Line (TEL) Stages 4 & 5
T268A	ST Engineering Electronics Ltd	Access Management System for Thomson-East Coast Line (TEL) Stages 4 & 5
T279A	MER MEC S.p.A	Multi-Function Vehicle for Thomson-East Coast Line
T373A	Bintai Kindenko Pte Ltd	Supply and Installation of Environmental Control System for 4-in-1 Rail and Bus Depot
T373B	Shinryo Corporation (Singapore Branch)	Supply and Installation of Tunnel Ventilation and Environmental Control Systems for Thomson-East Coast Line Stages 4 & 5, Downtown Line 3 Extension and East-West Line Upgrade
T375A	UG M&E Pte. Ltd.	Supply and Installation of Electrical Services for 4-In-1 Rail and Bus Depot
T375B	Guthrie Engineering (S) Pte Ltd	Supply and Installation of Electrical Services for Thomson-East Coast Line Stages 4 & 5, Downtown Line 3 Extension and East-West Line Upgrade
T378A	Chubb Singapore Private Limited	Supply and Installation of Fire Protection System for 4-in-1 Rail and Bus Depot
T378B	Chubb Singapore Private Limited	Supply and Installation of Fire Protection Systems for Thomson-East Coast Line Stages 4 & 5, Downtown Line 3 Extension and East-West Line Upgrade
T2157	P-Way Construction & Engineering Pte. Ltd.	Provision of Services for Operation of Works Train for Thomson-East Coast Line Stages 1, 2 & 3, Gali Batu Depot Extension and Tuas Depot Extension
T2162	Guthrie Engineering (S) Pte Ltd	Supply, Delivery, Installation, Testing and Commissioning of UPS and EPS Systems for Thomson-East Coast Line
T2163A	ZG Lighting Singapore Pte. Limited	Supply and Delivery of Luminaries for Non-Public Areas for Thomson-East Coast Line
T2163B	Koizumi Lighting Singapore Pte. Ltd.	Supply and Delivery of Luminaries for Public Areas for Thomson-East Coast Line
T2502	Yamato Technologies Pte. Ltd. / NKH Building Services Pte. Ltd. Consortium	Supply and Installation of Water Handling Equipment (WHE) for Thomson East-Coast Line

CIRCLE LINE 6 & NORTH EAST LINE EXTENSION

CONTRACT NO	CONTRACTOR	DESCRIPTION
715	China State Construction Engineering Corporation Limited	Construction of Cut-and-Cover and Bored Tunnels for North East Line Extension
7151	RCY Pte. Ltd.	Appointment of Qualified Person (Supervision) for Contract 715
821A	Woh Hup (Private) Limited	Construction of Kim Chuan Depot Extension for Circle Line 6
830F	Alstom Transport (S) Pte Ltd / Alstom Transport S.A.	Signalling System for Circle Line Stage 6 (CCL6) and Kim Chuan Depot Extension (KCDE)
830G	ST Engineering Electronics Ltd	Control Systems for Circle Line Stage 6 (CCL6) and Kim Chuan Depot Extension (KCDE)
851E	Alstom Transport (S) Pte Ltd / Alstom Transport S.A. Consortium	Trains for Circle Line Stage 6 and North East Line Extension
860E	ST Engineering Electronics Ltd	Communications System for Circle Line Stage 6
882	China State Construction Engineering Corporation Limited (Singapore Branch) - Nishimatsu Construction Co., Ltd Joint Venture	Construction of Keppel Station and Tunnels for Circle Line 6
883	China State Construction Engineering Corporation Ltd (Singapore Branch)	Construction of Cantonment Station for Circle Line 6
885	China Railway Tunnel Group Co., Ltd (Singapore Branch)	Construction of Prince Edward Station and Tunnels for Circle Line 6
886	Koh Brothers Building & Civil Engineering Contractor (Pte.) Ltd	Construction of Cut-and-Cover Tunnels at Marina Bay Area for Circle Line 6
8127	C K T Thomas Private Limited	Addition & Alteration (A&A) Works to Sengkang-Punggol Light Rapid Transit (SPLRT) Depot Workshop
8819	RCY Pte. Ltd.	Appointment of Qualified Person (Supervision) for Contract 821A
8820	Cast Laboratories Pte Ltd	Supply, Installation and Monitoring of Instruments for Contract 821A
8821	GeoAlliance Consultants Pte Ltd	Appointment of Qualified Person (Supervision) for Contract 882 and Contract 883
8822	Ryobi Geotechnique International Pte Ltd	Supply, Installation and Monitoring of Instruments for Contract 882 and Contract 883
8851	Ronnie & Koh Consultants Pte Ltd	Appointment of Qualified Person (Supervision) for Contract 885 and Contract 886
8852	Ryobi Geotechnique International Pte Ltd	Supply, Installation and Monitoring of Instruments for Contract 885 and Contract 886

DOWNTOWN LINE / CROSS ISLAND LINE

CONTRACT NO	CONTRACTOR	DESCRIPTION
952A	Siemens Rail Automation S.A.U and Siemens Mobility Pte Ltd Consortium	Signalling System & Platform Screen Doors for Downtown Line 3 Extension
955A	ST Engineering Electronics Ltd	Integrated Supervisory Control System for Downtown Line 3 Extension
956A	ST Engineering Electronics Ltd	Maintenance Management System for Downtown Line 3 Extension
960A	ST Engineering Electronics Ltd	Communications System for Downtown Line 3 Extension
968A	NCS Communications Engineering Pte Ltd	Access Management System for Downtown Line 3 Extension
C1008	Surbana Jurong Consultants Pte. Ltd. / TYPASA Pte. Ltd. Consortium	Mechanical and Electrical Engineering Services for Cross Island Line Eastern Leg (CRLe) Depot
C1009	Surbana Jurong Consultants Pte. Ltd.	Mechanical and Electrical Engineering Services for Cross Island Line Eastern (CRLe) Mainline

RAIL ENHANCEMENT WORKS

CONTRACT NO	CONTRACTOR	DESCRIPTION
152C	Thales Solutions Asia Private Limited	Signalling System for North-South East-West Lines Addition and Alteration Works and 4-in-1 Depot East West Line
160B	NCS Communications Engineering Pte Ltd	Communications System for 4-In-1 Depot - East West Line Including Addition and Alteration Works at Tanah Merah Station
801B	Bombardier (Singapore) Pte Ltd	Asset Replacement and Reliability Enhancement Works for Bukit Panjang Light Rapid Transit
1363A	PBT Engineering Pte Ltd	Implementation of Noise Barriers at Rail Viaduct Phase 2 (Package A)
1363B	PBT Engineering Pte Ltd	Implementation of Noise Barriers at Rail Viaduct Phase 2 (Package B)
R152	Siemens Mobility Pte Ltd ENGIE Services Singapore Pte. Ltd. Consortium	Track Circuit System for North-South and East-West Lines (NSEWL)
R153	Meiden Singapore Pte. Ltd.	Power Supply Upgrading for North-South East-West Line - High Voltage Power Supply System and Associated Equipment
R153A	Meiden Singapore Pte. Ltd.	Power Supply Upgrading for North-South East-West Line - Traction Power Supply System, Power SCADA and Associated Equipment
R155	Power Automation Pte Ltd	Supervisory Control System Addition and Alteration Works For North-South East-West Line Power Supply Upgrading
R1002	PYPUN-KD & Associates Limited	Condition Assessment of Rail Operating Assets
R1521	Thales Solutions Asia Pte Ltd	Train-Borne Signalling System for New North-South/East-West Lines Trains)
R8201	Swee Builders Pte Ltd	Infrastructure Works at Sengkang and Punggol Light Rapid Transit
TOTAL SUM AWARDED FOR RAIL PROJECTS		\$6.9 billion

NORTH-SOUTH CORRIDOR

CONTRACT NO	CONTRACTOR	DESCRIPTION
N106	Samsung C&T Corporation	Design and Construction of North-South Corridor (Tunnel) Between Novena Rise and Toa Payoh Rise
N1030	Arup Singapore Private Limited	Consultancy Study for North-South Corridor (NSC)
N1037	ST Engineering Electronics Ltd	Reinstatement Works for North-South Corridor (Closed-Circuit Television)
N1038	Aik Sun Demolition & Engineering Pte Ltd	Reinstatement Works for North-South Corridor

ROAD CONSTRUCTION / DEVELOPMENT

CONTRACT NO	CONTRACTOR	DESCRIPTION
ER381	Megastone Holdings Pte Ltd	Works at Balmoral Road / Bukit Timah Road Junction and Newton Circus
ER489	Megastone Holdings Pte Ltd	Construction of Vehicular Underpass at PIE Exit 26A
ER497	Sing Tec Development Pte Ltd	Widening of Tampines Avenue 7 between Tampines Expressway and Tampines Street 34
ER507A	Koon Construction & Transport Co. Pte Ltd	New Road Connections to Seletar Link and Widening of TPE between Jalan Kayu and Punggol West Flyovers
ER521A	Megastone Holdings Pte Ltd	Works at Slip Road from Pan Island Expressway to Airport Boulevard
ER529A	Quek & Quek Civil Engineering Pte Ltd	Senja / Kranji Expressway (KJE) Interchange

COMMUTER FACILITIES ENHANCEMENT

CONTRACT NO	CONTRACTOR	DESCRIPTION
DE101	Surbana Jurong Consultants Pte. Ltd	Architectural/Engineering Services for Implementation of New Bus Interchanges
DE108A	Kim Seng Heng Engineering Construction (Pte) Ltd	Design and Construction of Bus Interchange and its Associated Works at Jurong Gateway Road
DE109	Liu & Wo Architects Pte Ltd and AECOM Singapore Pte. Ltd.	Architectural / Engineering Services for Upgrading of Existing Bus Interchanges
DE112	CCECC Singapore Pte Ltd	Proposed Pedestrian Overhead Bridge and Enhancement to Existing Commuter Infrastructure
DE115	Pal-Link Construction Pte. Ltd.	Proposed Lift Shafts to Existing Pedestrian Overhead Bridges and Associated Commuter Infrastructure
DE116	Hong Shin Builders Pte Ltd	Proposed Lift Shafts to Existing Pedestrian Overhead Bridges and Associated Commuter Infrastructure
ER522	Yew Ann Construction Pte Ltd	Proposed Commuter Infrastructure Enhancement
ER523	Surbana Jurong Consultants Pte. Ltd	Architectural / Engineering Services for Enhancements of Existing Bus Stop Infrastructures
PL188	CHC Construction Pte Ltd	Design and Construction of Cycling Facilities
PL197	AECOM Singapore Pte. Ltd.	Engineering Consultancy Services for the Design of Cycling Routes
PT247	CCECC Singapore Pte Ltd	Upgrading of Woodlands Regional Bus Interchange
RD320	CPC Construction Pte Ltd	Expansion of Yio Chu Kang Bus Interchange

PUBLIC TRANSPORT

CONTRACT NO	CONTRACTOR	DESCRIPTION
IT213	Tech Mahindra Limited (Singapore Branch)	Bus Maintenance Management System
PT202	SBS Transit Ltd	Bus Contracting - Seletar Bus Package
PT203	SBS Transit Ltd	Bus Contracting - Bukit Merah Bus Package
PT313	Volvo East Asia (Pte) Ltd	Procurement of Diesel Hybrid Buses (DHB)
PT327A	Via Transportation, Inc	Development and Trial for On-Demand Bus Services
PT327B	Ministry of Movement Pte Ltd	Development and Trial for On-Demand Bus Services
PT337	Singapore Technologies Kinetics Ltd	Procurement of 250 Man Buses
RS101	Tangshan Baichuan Intelligent Machine Co., Ltd.	Provision of Bus Depot Equipment

TRAFFIC OPERATIONS / MANAGEMENT

CONTRACT NO	CONTRACTOR	DESCRIPTION
TR245	Cognizant Technology Solutions Asia Pacific Pte. Ltd.	Implementation, Operations and Maintenance of Reports Processing and Management System
TR257	Sopra Steria Asia Pte. Ltd.	Unified Maintenance HUB 2.0 (UMH2.0)
TR259	Tyco Fire, Security & Services Pte Ltd	LED Street Lighting with Remote Control and Monitoring Sytem (RCMS)
TR262	Double-Trans Pte Ltd	Term Contract for Road-Related Facilities, Road Structures and Road Safety Schemes
TR263	Gim Tian Civil Engineering Pte Ltd	Tunnel Washing Services for Road Tunnels
TR266	Motorola Solutions Singapore Pte. Ltd.	Comprehensive Maintenance of Radio Communications System
TR267	ATS Traffic Pte Ltd	Comprehensive Maintenance of GLIDE System
TR268	CPG Facilities Management Pte Ltd	Maintenance of Central Expressway Tunnels, Fort Canning Tunnel and Woodsville Tunnel E&M Works
TR269	Tyco Fire, Security & Services Pte Ltd	Comprehensive Maintenance of KPE and MCE Integrated Traffic and Plan Management System (Front End)
TR271	Novaars International Pte. Ltd.	Regular Inspection of Major Road Structures
TR278	Certis CISCO Auxiliary Police Force Pte. Ltd.	Provision of LTA Parking Warden Services
TR279E	Certis CISCO Auxiliary Police Force Pte. Ltd.	Provision of Parking Warden Services (Contract 1E)
TR279W	Certis CISCO Auxiliary Police Force Pte. Ltd.	Provision of Parking Warden Services (Contract 1W)
TR286	Guthrie Engineering (S) Pte Ltd	Design, Supply and Installation of Fixed Water-Based Fire-Fighting System
TR288	JCDecaux Singapore Pte Ltd	Management and Maintenance of Bus Shelters and Their Advertising Spaces
TOTAL SUM AWARDED FOR ROADS AND OTHER PROJECTS		\$2.7 billion

CONTRACTS TO BE AWARDED IN FY2018/19**RAIL**

CONTRACT NO	DESCRIPTION
831D	Supply and Installation of Mechanical Services for Kim Chuan Depot Extension for Circle Line 6
831E	Environmental Control and Tunnel Ventilation Systems at Circle Line Stage 6 Mainline and North East Line Extension
832D	Supply and Installation of Electrical Services for Kim Chuan Depot Extension for Circle Line 6
836A	Depot Equipment for Kim Chuan Depot Extension
838B	Locomotives for Circle Line Stage 6 and Existing Lines
850E	Trackwork for Circle Line 6 and Depot Extension & North East Line Mainline and Depot Extension
852F	Platform Screen Doors for Circle Line Stage 6 (CCL6) and North East Line Extension (NELe)
853E	Power Supply System for Circle Line Stage 6 and North East Line Extension
1503	Pasir Ris Rail Turnback
7086	Design and Build of Enhancement Works at Sengkang MRT and LRT Interchange Station
7087	Communications System and Station Travel Information System (STIS) for the Enhancement Works at Sengkang MRT and LRT Interchange Station
J1019	Sewer Diversion at Boon Lay and Jurong West
J1020	Services Diversion and Associated Works (Package 1)
J1026	Services Diversion and Associated Works (Package 2)
R151	Trains for North-South / East-West Lines
R1006	Rail Enterprise Asset Management System (Rail EAMS)
RC111	Road Works At City Centre
T279B	Rail Grinding Vehicle for Thomson-East Coast Line
T371A	Design, Supply and Installation of Lifts for Thomson-East Coast Line Stages 4 & 5 and Commuter Facilities
T371B	Design, Supply and Installation of Escalators for Thomson-East Coast Line Stages 4 & 5 and Commuter Facilities
T2180	Trackwork A&A for Thomson-East Coast Line Stages 2 & 3
T2188	Construction of Covered Linkways to Thomson East Coast Line (TEL) Stages 1, 2 & 3 Stations

ROADS AND OTHERS

CONTRACT NO	DESCRIPTION
DE120	Enhancement of Tampines Avenue 10 between Tampines Avenue 5 and Tampines Expressway
DE122	Commuter and Road Infrastructure Works on Bedok North Avenue 1 between Bedok North Street 1 and New Upper Changi Road
DE123	Widening of Tampines Road between Kallang Paya Lebar Expressway (KPE) and Tampines Avenue 10
DE132	Commuter and Road Infrastructure Works at Woodlands Avenue 1/ Avenue 2 and Woodlands Avenue 5/ Avenue 12
DE133	Proposed multi-storey Sengkang West Bus Depot
DE135	Construction of new road at Punggol
DE136	Road works at Tanah Merah Coast Road
N101	Design and Construction of North-South Corridor (Tunnel) between ECP and Victoria Street
N102	Design and Construction of North-South Corridor (Tunnel) between Victoria Street and Kampong Java Road
N103	Design and Construction of North-South Corridor (Tunnel) between Kampong Java Road and Suffolk Walk
N105	Design and Construction of North-South Corridor (Tunnel) between Suffolk Walk and Novena Rise
N107	Design and Construction of North-South Corridor (Tunnel) between Toa Payoh Rise and Marymount Lane
N108	Design and Construction of North-South Corridor (Tunnel) between Marymount Lane and Pemimpin Place
N109	Design and Construction of North-South Corridor (Tunnel) between Pemimpin Place and Sin Ming Avenue
N109A	Design and Construction of North-South Corridor (Tunnel) between Sin Ming Avenue and Ang Mo Kio Avenue 3
N110	Design and Construction of North-South Corridor (Tunnel) between Ang Mo Kio Ave 3 and Ang Mo Kio Ave 9
N111	Design and Construction of North-South Corridor (Tunnel and Viaduct) between Ang Mo Kio Ave 9 and Sungei Seletar
N160	Communications System for North-South Corridor
N165	Integrated Traffic and Plant Management System for North-South Corridor

CONTRACT NO	DESCRIPTION
PL201	Engineering Consultancy Services for the Design of Cycling Path Network
PT193	Proposed Design and Construction of Bus Terminal and Associated Works at Marina Centre
PT322	Procurement of Euro 6 Double Deck Diesel Buses
PT323	Procurement of Electric Buses (E-Buses)
PT342	Procurement of 3-Door Euro 6 Double Deck Diesel Buses
TR289	Upgrading of Roads, Road Structures and Road-Related Facilities
TR291	Construction of Silver Zones
TR299	Provision of Auxiliary Police Officers, Security Officers and Towing Services for F1 event (Traffic Control)
TR300	Term Contract for Road-Related Facilities, Road Structures and Road Safety Schemes
TT231	Upgrading of I-Transport System
TT236	Maintenance of Fort Canning and Woodsville Tunnel Traffic System
TT238	Maintenance of Expressway Monitoring and Advisory System (EMAS)

FY2017/18 FINANCIAL HIGHLIGHTS

Statement of Comprehensive Income

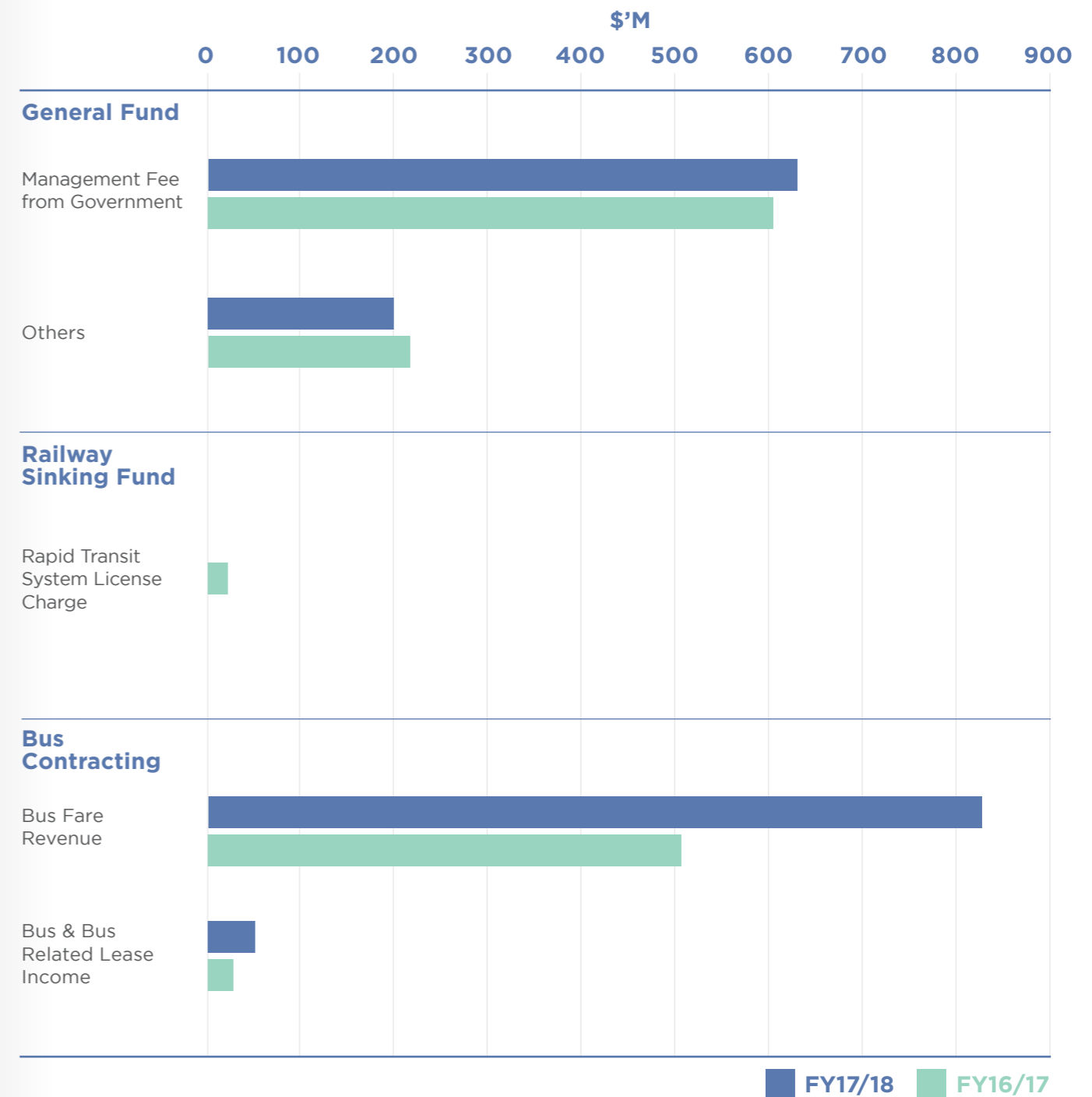
At the Authority level, the net deficit for FY17/18 is \$172m, after netting off government grants. This is contributed by net deficit in the General Fund (\$84m), net deficit in the Restricted Fund – Railway Sinking Fund (\$99m), offset by net surplus in the Restricted Fund – Bus Contracting (\$11m).

FY17/18	General Fund \$'M	Railway Sinking Fund \$'M	Bus Contracting \$'M	Total \$'M
Operating Income	824	-	904	1,728
Operating Expenditure	(1,881)	(101)	(1,770)	(3,752)
Operating Deficit	(1,057)	(101)	(866)	(2,024)
Other Gains - Net	8	2	2	12
Deficit before Government Grants	(1,049)	(99)	(864)	(2,012)
Government Grants	965	-	875	1,840
(Deficit)/Surplus before Contribution to Consolidated Fund	(84)	(99)	11	(172)

FY16/17	General Fund \$'M	Railway Sinking Fund \$'M	Bus Contracting \$'M	Total \$'M
Operating Income	823	33	554	1,410
Operating Expenditure	(1,677)	(62)	(979)	(2,718)
Operating Deficit	(854)	(29)	(425)	(1,308)
Other Gains - Net	9	1	1	11
Deficit before Government Grants	(845)	(28)	(424)	(1,297)
Government Grants	808	-	423	1,231
Deficit before Contribution to Consolidated Fund	(37)	(28)	(1)	(66)

Operating Income

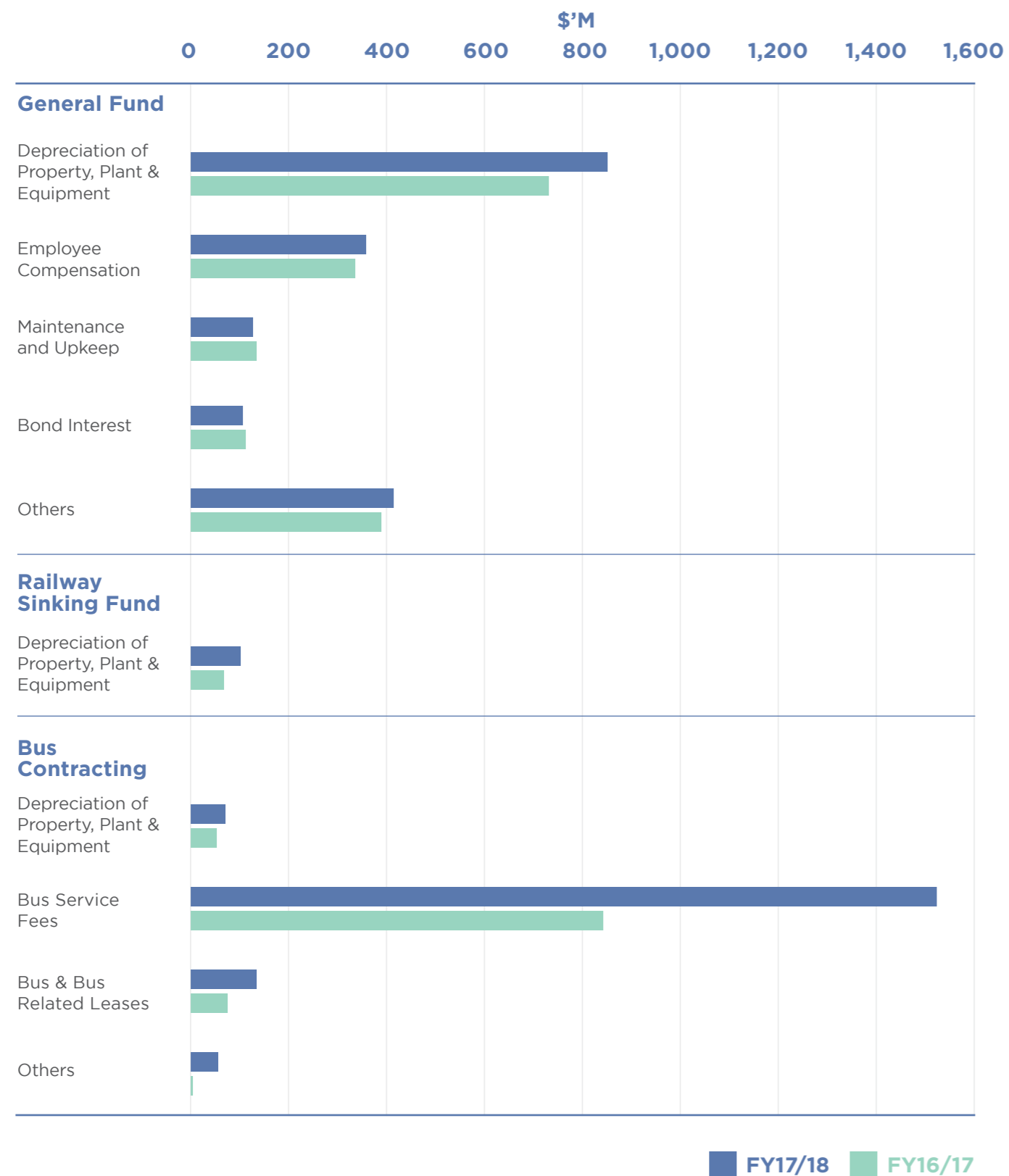
The Authority's total operating income of \$1,728m in FY17/18 is an increase of \$318m (23%) over FY16/17's income of \$1,410m. The increase is mainly due to Bus Contracting receiving full year income from Bus Fare Revenue and Bus and Bus-Related Lease Income versus 7 months of income in FY16/17 as majority of the Bus Contracting activities commenced from 1 September 2016.



FY2017/18 FINANCIAL HIGHLIGHTS

Operating Expenditure

The Authority incurred total operating expenditure of \$3,752m in FY17/18, an increase of \$1,034m (38%) over FY16/17's expenditure of \$2,718m. The increase of \$1,034m is mainly due to Bus Contracting incurring full year of Bus Service Fees paid to the public bus operators for the provision of bus services versus 7 months of expenditure in FY16/17 as majority of the Bus Contracting activities commenced from 1 September 2016.

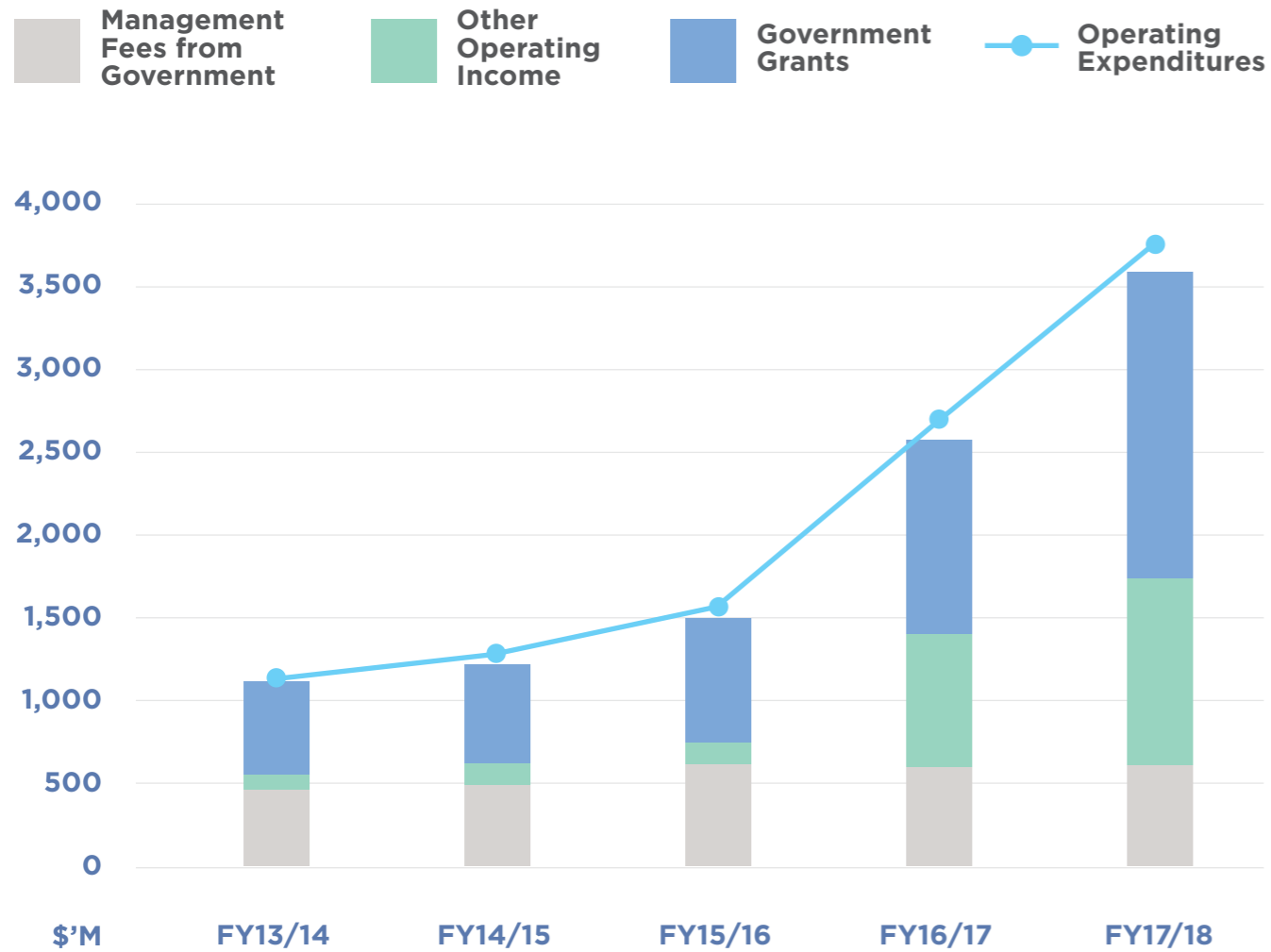


Balance Sheet

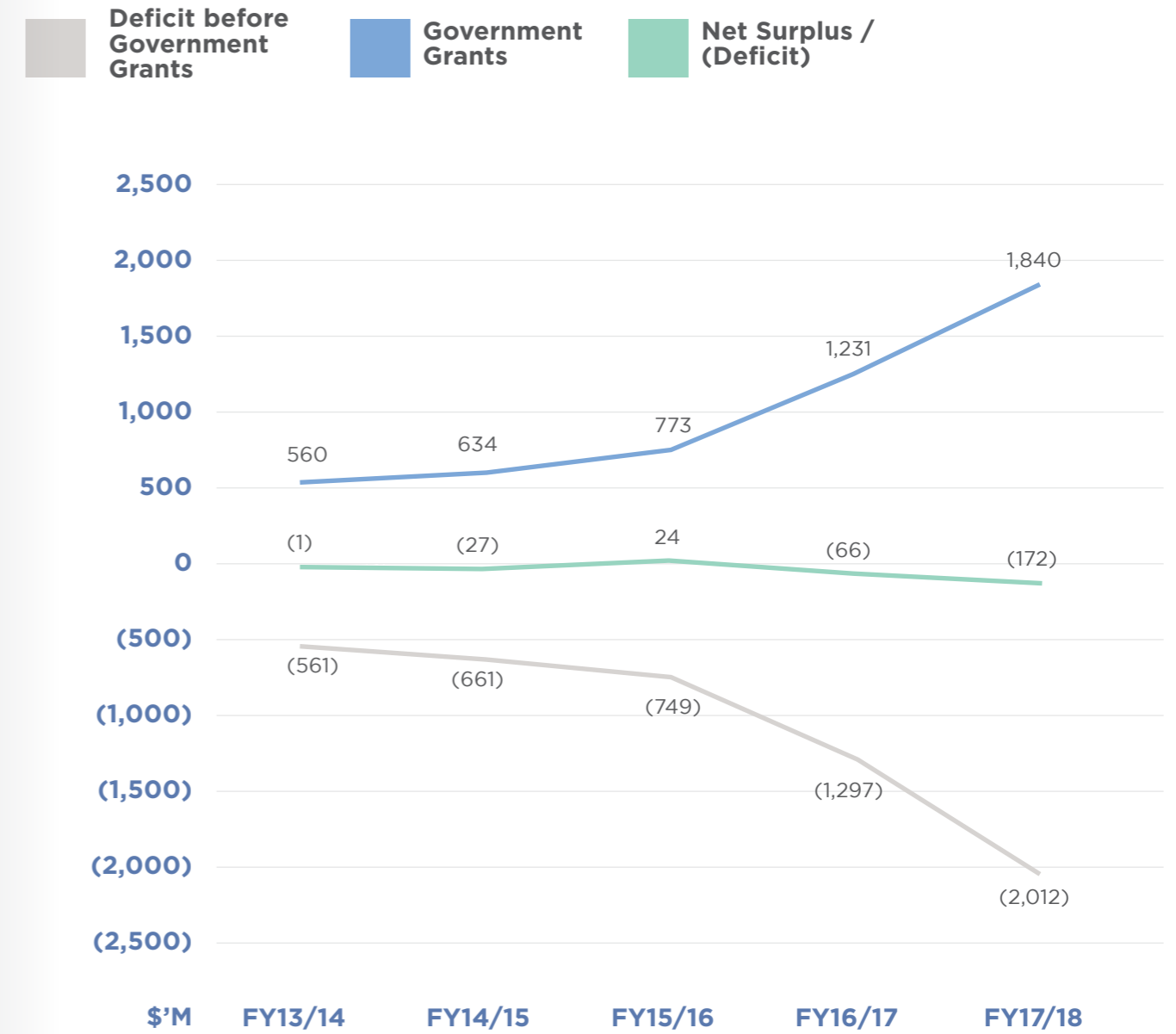
	FY17/18 \$'M	FY16/17 \$'M	Variance \$'M
Property, Plant & Equipment	47,906	43,815	4,091
Viaducts and Tunnels	10,236	8,001	2,235
Stations, Buildings and Structures	13,058	10,049	3,009
Rolling Stock	3,059	2,181	878
Buses & Bus-Related Assets	787	696	91
Construction-In-Progress	12,719	16,435	(3,716)
Others	8,047	6,453	1,594
Other Non-Current Assets	35	35	-
Current Assets	8,526	5,798	2,728
Assets	56,467	49,648	6,819
Equity	4,171	3,022	1,149
Borrowings	4,975	3,475	1,500
Deferred Government Capital Grants	44,160	40,075	4,085
Other Non-Current Liabilities	1,359	1,374	(15)
Current Liabilities	1,802	1,702	100
Equity & Liabilities	56,467	49,648	6,819

5-YEAR FINANCIAL SUMMARY

Operating Income, Government Grants & Expenditure



Net Surplus / (Deficit)





1 Hampshire Road, Singapore 219428
10 Sin Ming Drive, Singapore 575701
71 Chai Chee Street, Singapore 468981

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