

## Light Rail Transit (LRT) and Road Tunnels FAQs

### Q1. Why can't LRT share a tunnel with road traffic?

It is adopted international best practice for rail (including LRT) and road traffic to be kept separate from one another in tunnels for operational, safety, maintenance and design consideration reasons. It is the combination of these factors that make a LRT/Road tunnel impractical.

### Q2. What are the operational issues of LRT sharing the duplicate tunnel proposed by the NZTA?

Operational issues arise from how LRT and road traffic would operate and interact both in terms of merging together prior to entering a tunnel and how they would travel through a tunnel together. Some of the key operational issues that would be complex to overcome are as follows:

#### 2.1 Moving from exclusive lanes to a shared lane

A shared LRT/road tunnel would require LRT to move from being in its own lane(s) outside of the tunnel to a shared lane before entering the tunnel. This "transition" would need to be managed by traffic lights, particularly for eastbound travel around the Basin Reserve into the tunnel and westbound travel from Ruahine Street into the tunnel. The most likely option would be installation of traffic lights to allow LRT to safely move into the shared lane from its own lane(s). Such a transition is likely to cause delays for general traffic as well as for LRT passengers.

#### 2.2 Powering LRT in a LRT/road tunnel

A key challenge that adds to the complexity of operating a potential LRT/road tunnel would be how LRT would be powered in the tunnel. Outside of the tunnel, LRT would be powered by an overhead electrical cable system, but in a tunnel (where there would already be a lot of overhead electrical equipment such as lights, fans and signs for road traffic purposes) the power system would need to be underneath the LRT vehicle, either with an inductive loop or a third rail system providing power. Such LRT vehicles would therefore need to be capable of running on both overhead and underground electrical systems, which adds complexity and cost.

#### 2.3 Electrical system maintenance

Maintenance of the electrical systems in road tunnels can be complex at times. An electrical system in a LRT/road tunnel combined with "business as usual" tunnel operational issues (eg rail/car breakdowns, drainage and other tunnel system operations) would add complexity and likely result in significant "whole of life" costs.

Such maintenance requirements would also impact negatively on LRT's operational performance. It is likely that a LRT/road tunnel would need to close more frequently (compared to separate LRT tunnel) in order to maintain the electrical system for the road network and/or LRT system. This would affect both general traffic and LRT traffic.

#### 2.4 Complications arising from sharing a tunnel with general traffic

To provide LRT services in both directions using shared tunnels would require one track to be in the new LRT/road tunnel (eg for eastbound LRT traffic) and the other to be in the existing Mt Victoria Tunnel (eg westbound LRT traffic). However, under such a scenario, if

an incident in one of the tunnels restricted the use of the LRT track then there would be no ability to run LRT in the reverse direction in the other tunnel. This is because LRT vehicles would be running against traffic flow, which would be a significant concern from a fire life safety perspective. Such an outcome would impact on the entire LRT system as services would need to be halted whilst the incident was cleared.

In addition, reconfiguring the existing Mt Victoria Tunnel in order for one lane to be used for LRT traffic would significantly impact on the capacity of the SH1 network as well as the local road network. Widening of the existing tunnel would also be significantly complex and expensive (see Q4).

## **2.5 Tunnel ventilation**

Tunnel ventilation in a LRT/road tunnel is likely to be more complex compared to a LRT only tunnel. Additional ventilation to manage air pollution would be required to ensure LRT passengers were comfortable if the LRT/road tunnel was to become congested at peak travelling times. Additional ventilation would increase construction and “whole of life” costs.

## **2.6 Operating speeds**

The operating speeds of LRT and road traffic in a LRT/road tunnel would be interdependent. For example, if general traffic congestion occurred or there was an incident on the road in the tunnel then the operating speed of LRT would be slowed for safety reasons, there would also be no opportunity for LRT to “change lanes” to bypass the congestion or the incident.

### **Q3. What would be the safety considerations of LRT sharing a tunnel with road traffic?**

There would be significant fire life safety concerns as to how an incident (including fire) could be feasibly managed in a LRT/road tunnel. For example, in the event of an accident, drivers and LRT passengers would need to get out of their vehicles and safely move to the portal or a cross passage exit. To achieve such an outcome, the LRT/road tunnel would need to be designed to ensure that any power system for LRT does not put people at risk of electrocution whilst attempting to escape the incident. Such a design would be complex and expensive.

The design and/or location of the emergency exit cross passages would be complex given the length of LRT vehicles and the need to avoid them blocking access to cross passages. Furthermore, additional cross passages may be needed to cater for the “extra people” that would be using a LRT/road tunnel (compared to the number of people that would use either a road or LRT tunnel), which would add to construction costs.

### **Q4. Can the existing Mt Victoria Tunnel be widened to accommodate LRT?**

It is very unlikely. It would be extremely complex and expensive to widen the tunnel to accommodate LRT, and would require the complete closure of the tunnel to undertaken the widening. Widening works would take a long time to complete.

### **Q5. Are there any overseas examples where LRT and road traffic share lanes in tunnels?**

We are not aware of any LRT/road tunnels that have been built or operated elsewhere. We are aware of public transport tunnels where LRT vehicles and buses mix in the same tunnel without separation.

Rail/road tunnels are built and operated elsewhere, but rail and road traffic is always located in separate tunnel bores (i.e. rail and road traffic do not mix in the same tunnel bore).

Rail/road traffic needs to be separated for fire life safety, operational and maintenance reasons (see the previous answers).

So, if we were to build a LRT/road tunnel we would be one of the first to do so (if not the first), and we would be contradicting accepted international best practice for operating tunnels.

**Q6. Why can't a LRT tunnel be built to the north of Paterson Street?**

It may be technically feasible to build a LRT tunnel to the north of Paterson Street and the duplicate tunnel proposed by the NZTA. It is likely that the most cost effective way of doing so would be to construct it at the same time as the proposed duplicate tunnel was being built. The costs of a LRT tunnel would be of a similar magnitude to the costs reported in the Public Transport Spine Study (PTSS).

It is likely that such a tunnel would be around 25m further to the north of the proposed location for the duplicate tunnel (to allow rock strength between the tunnels). A significant number of properties would need to be removed to provide one or possibly two LRT tracks on top of the properties already identified for removal for the SH1 widening purposes.

A LRT tunnel would still face the similar track integration problems on either side of Mt Victoria as described in the answers for a LRT/road tunnel. That is, integration would be a complex and costly engineering task. However, these track integration problems are less problematic if the LRT tunnel is located to the south of the existing Mt Victoria Tunnel (and Paterson Street) as proposed in the PTSS.

**Q7. Could a single track LRT tunnel be built?**

Yes, a single track LRT tunnel could be built (either to the north or south of the existing Mt Victoria Tunnel) and operated in a similar fashion to the existing bus tunnel. However, such a tunnel plus the entire LRT system would be susceptible to incidents occurring in the tunnel. For example, in the event of an incident, the LRT tunnel may need to be closed down while the incident was cleared and the necessary repairs undertaken. Tunnel closure could affect the entire LRT system operations to and from the east.

Whilst costs could reduce if a one track tunnel was built, a single track tunnel would not provide value for money for future generations if at some point they wished to double track the LRT system.