

CASE STUDY

Smart City Infrastructure Solutions

LVX Designs & Delivers World First Smart City Solution for WA Government



Government of **Western Australia**
Public Transport Authority



The \$240 Million Butler Rail Extension & Station was completed in Late 2013, and incorporates LVX Global's Lighting & Systems Design & Maintenance Principles developed and documented for PTA over a rigorous 18 month due diligence process

Background

The Government of Western Australia's Public Transport Authority, (PTA), is responsible for the operation, management, and maintenance of all urban heavy rail, bus, and ferry infrastructure in Perth, Western Australia. Committed to providing the safest, most efficient, sustainable, and cost-effective service possible for more than 140 million passengers annually, PTA has consistently pursued technical innovation to improve its assets, in particular lighting.



PTA's Upgraded State of the Art Central Monitoring Room at the Public Transport Centre was completed in 2011, becoming PTA's first Commercial Office Asset to come on-line

In an Australian first PTA engaged LVX's Consultant Services Division to audit their general and emergency lighting assets and provide technical recommendations with the ambitious aim of developing and delivering the safest, most sustainable and cost effective IoT/Smart City lighting & Life Safety System controls and monitoring solution in the world.

After a rigorous 18 month due diligence process, including successful in situ trials delivered by LVX's Field Services Division, PTA adopted LVX's engineered solution in early 2013. These design, maintenance and management principles have now been captured in the PTA Lighting Design & Maintenance Guideline Revision 3.00 prepared by LVX Group's Consultant Services Division. This Guideline governs the management of over 10,000 emergency lighting points and 100,000 general lighting points within the PTA asset base and is the overarching document that governs all future designs and assets.

With a detailed commercial and operational implementation strategy designed to optimise return on investment by marrying in capital works, capital replacement and reactive maintenance programs, this project, to be delivered over 10 years is one of the largest in the world, and easily the largest and most complex sustainable & intelligent lighting project ever to be delivered in Australia.

Emergency Lighting & Life Safety Systems

PTA first engaged LVX to review its emergency lighting assets, and management strategies and to conduct rigorous technical, commercial and risk due diligence. As a result, PTA trialed and adopted its preferred emergency lighting and exit sign monitoring system. This solution is built around Lomworks open protocol powerline and RF communications technology, and is integrated via the PTA Ethernet to a Central Server. At the Central Server 3 instances of Window Virtual Machine individually host the Rail, Bus and Commercial Assets respectively.

This technology provides real-time monitoring and automated compliance reporting for PTA's life-safety lighting, providing World's Best Practice for life safety systems. This program is being rolled out in throughout PTA's entire asset portfolio, with several thousand points now under centralised management.



The New \$249 Million Wellington Street Bus Station Project delivered in late 2016, also incorporates the Design Principles and Systems Developed & Documents by LVX Group in PTA's Lighting Design & Maintenance Guideline Revision 3.01.

General Lighting Monitoring & Controls

Risk

Lighting is a critical infrastructure asset, and it is the unwavering view of LVX's Risk Team that the outsourcing of critical assets poses too great a risk for government. The role of the Lighting Asset Manager is to help the client manage their own assets, not to wrest control of these assets from the client. Accordingly, the solution developed for the Government of Western Australia is owned and operated by them, with the assistance of interchangeable third parties.

Technology

The Engineered Solution developed by LVX for general lighting also utilises Lonworks open protocol powerline & RF communications architecture, and reports through CMS software, hosted and mirrored at the PTA Server.

Independence & Control

Importantly, the solution retains the client's independence in terms of luminaire selection, it benchmarks cost, and guarantees the availability of equipment for the term of the project. Accredited luminaire suppliers were all put through a detailed commercial and technical Due Diligence process and successful companies were included on the PTA Approved Luminaires and Suppliers Panel.



The First Train on the CityLink Fremantle Tunnel Line: On time on 18th August 2013. There are 1,142 Emergency Lights & Exit Signs being monitored in this tunnel alone

Features & Benefits

The value point of any LVX Solution is always the development and application of service and technology to Risk and Business Case imperatives.

Only when engineering and finance departments are seeing eye-to-eye, do we have a solution.

The PTA IoT based Smart City Solution enhances efficiency, compliance, and cost management for all aspects of lighting expenditure:

- reactive maintenance
- preventive maintenance, and
- capital works

Energy Savings

Luminaires are programmed to save energy:

- car park and platform lights can be dimmed at times when no traffic is expected
- constant output features mean areas are never over illuminated in order to meet end of life illuminance level requirements, and
- the lighting system alerts maintenance personnel to the exact locations of failed lamps, saving time and money while optimising safety.



The \$609 Million Perth CityLink Rail project was successfully completed in 2015 and fully incorporates the LVX designed and delivered engineered solution.

Warranty Management

Improvements in LED warranty accountability alone are expected to save millions of dollar per year, because the monitoring system can determine if LED lamps have failed inside the manufacturer's warranty period, and if the fittings have been operating within specified parameters of temperature, supply voltage, switching cycles and hours of operation.

Truth in Design

Control brings certainty, and for the first time in an exterior lighting application designers and contractors alike can be sure that illuminance levels will be delivered as designed. This is extremely valuable in the public consultation process, where not only AS/NZS1158 requirements are critical, but also AS4282 and the Obtrusive Effects of Lighting, (Glare). A detailed design verification process and final review sign-off process ensure that lighting levels can be adjusted on site, meaning that systems are delivered as designed, given comfort and surety to all stakeholders.



The Kenwick Station Upgrade was successfully delivered in 2015

Service Benefits

Controllability means that equipment can be standardised. In the instance of soffit and canopy lights, one fixture can replace 19 lamp type variants, meaning far fewer parts and spare fittings are required to be kept on hand, and rectification and non-conformance windows are dramatically reduced.

The Environment

All of LVX Global's solutions include as standard environmental Best Practice initiatives including:

- recycling of all waste, including toxic metals such as:
 - lead
 - mercury
 - cadmium
- the use of recycled materials and packaging

Planning & Budgeting

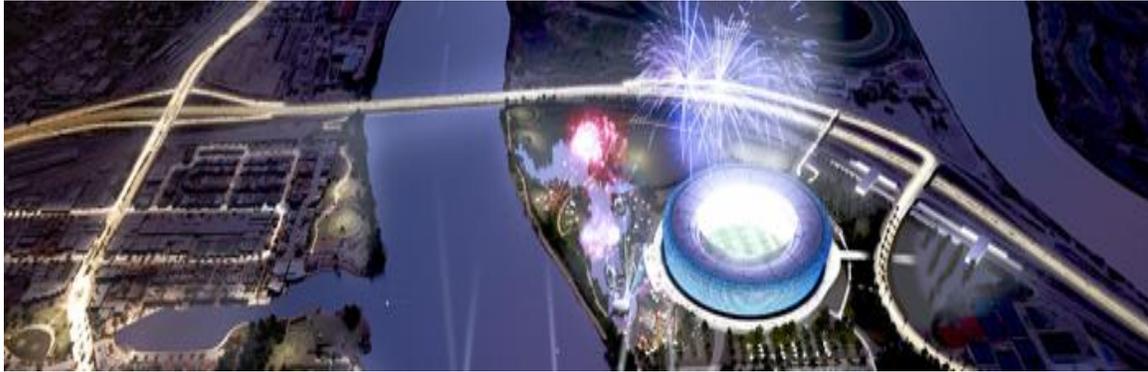
Uniquely, the PTA solution translates technical information and data into financial planning reports, providing certainty in reactive and capital replacement lines of the budget.

- Reactive Maintenance activities can be consolidated by region, providing significant savings in labour cost, (internal or external)
- The allocation of fixed costs, (parts & labour), to activities means that in real time:
 - total non-current service liabilities can be calculated for the entire asset, and
 - subsequent financial period capital replacement liabilities can be planned and calculated
- The total value of the asset, (depreciated from acquisition date), can be calculated
- The entire lighting asset can be cross-referenced and incorporated into a standardised asset management software and reference format

The Future

Implementation & Expansion

Every day PTA continues to deliver this systemised IoT Smart City solution to its various assets including station platforms, pedestrian crossings, service and stowage yards, tunnels, and car parks.



The \$298 Million Perth Stadium Integrated Train, Bus & Pedestrian Approach, completed in late 2017, transports over 50,000 people (83% of a Capacity Crowd), within 1 hour of an event finishing and incorporates LVX State of the Art IoT based Smart City Lighting & Life safety Asset Management Engineered Solution

New Technology

Trials of associated technology, including noise, temperature, humidity and barometric pressure monitoring and metering, as well as the incorporation of power-line communication cameras, and Recognition as a Service, (“RaaS”), are also being developed, designed and documented, and will be reviewed for in situ trial in the next 10 months.

Other Asset Types

Unlike all other Smart Lighting infrastructure solutions, the PTA solution accommodates exterior and interior luminaires, allowing the PTA to monitor and control ALL of its lighting assets on one centralised IoT based system.

This solution for the provision of lighting controls and monitoring for commercial applications using the power-line and RF is transformative for the industry, as no longer are impractical and expensive data bus installations required for existing assets to provide controls. This solution presents a compelling Business Case for owners and operators of existing low-grade assets, and offers the attractive additional feature of monitoring, not only traditional control.

The Environment

Among many other initiatives the standardisation of ultra-long life, high temperature, non-toxic Lithium Iron Phosphate batteries and the use of lead free solder on all circuit boards has had a major impact on the overall environmental impact of the PTA’s lighting assets.



The \$1.8Bn Forresterfield Airport Link Project is the largest single infrastructure project in WA's history and incorporates all of the Smart City design engineered solution developed, documented, project managed and certified by LVX.

Directional Sound & Wayfinding

A trial is in conception to include patented directional sound and way-finding technology into the Emergency Lighting System to enhance egress times in fire safety incidents and as an aid to the vision impaired.

More Information



There is ALWAYS a Solution

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**Government of Western Australia
Public Transport Authority**

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