



# ARCS Capability and Reference Projects

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## 1. WHO ARE THE ARCS GROUP?

The ARCS Group (ARCS) is a group of industry professionals with specialist and significant engineering experience in infrastructure delivery focussed on technical systems and the application of innovative technology solutions to solve difficult problems.

ARCS are both consultants and solution providers with extensive experience in both areas. Typically, we only work as either a consultant or a system supplier to remove conflict and provide the required client services without compromising the work.

ARCS has provided specialised technical and project management consulting to organisations such as the Public Transport Authority of WA, Brookfield Rail, Sydney Trains, VLine, Queensland Rail, Aurizon, TasRail and many other rail, transport, utilities and infrastructure organisations for over 35 years.

This work typically encompassed:

- Technical consulting
- Project management
- Project superintendence
- Project development
- Business case development
- Strategic planning
- Asset management
- Support and maintenance
- Requirements gathering
- System design
- Tender documentation
- Calling for tenders
- Contract and project management
- Project handover

Increasingly, we found our design expertise being called on to solve technology and operational problems and in the past seven or eight years have been moving more into the system design and systems solution space.

ARCS have extensive experience in the fields of systems integration, asset monitoring, SCADA, CCTV, train control, telecommunications and related disciplines across many different industries including rail, transport, power and process industries. We have extensive experience in applied technology in many engineering fields and specialise in transport systems.

Over the past 35 plus years ARCS have worked and consulted in many technology areas and have been involved in urban and freight railways in WA, NSW, Queensland, Victoria and Tasmania and have been involved in the design, construction, implementation and support of the train control, SCADA, passenger

information, asset monitoring and protection and operational systems for Westrail, Public Transport Authority, WestNet Rail, Brookfield Rail, Queensland Rail, Aurizon, BHPB, Rio Tinto, TasRail, VLine and MTM and a number of other private rail operators and contractors.

We have also provided IoT solutions to Ipswich City Council, Tamworth Regional Council, Cherbourg Aboriginal Shire Council, Main Roads WA and others.

ARCS have recently been extensively involved in commissioning of the Perth City Bus port technology systems including HVAC, Vertical Transport, Fire and Hydraulic Systems, BMS Controls and Commissioning technology systems. We have also been involved in the WA Main roads congestion monitoring for the SW freeway. ARCS has installed and continue to maintain several level crossing management systems in WA and Queensland.

There are also several key aspects of ARCS which we believe enables us to provide better value for clients.

- **Firstly is our ability to “think outside the box” and in conjunction with our clients** provide innovative solutions that solve their problems. This is important in the context of the DCC requiring their lead consultant to be able to adapt to the rapidly evolving smart city landscape.
- **Unlike larger organisations the senior staff in the ARCS Group are “hands on”** and are closely involved in all aspects of projects, thus ensuring the required high levels of skills and experience are brought to bear.
- Our approach to projects ensures **close collaboration with the client’s staff** and we seek to enhance their knowledge and skills during project delivery.
- The combined expertise of the ARCS group is able to provide Smart Cities Consultancy combined with an intimate knowledge of the implementation issues associated with the technologies involved.

## 1.1 SPECIALIST AND EXPERIENCED RESOURCES

ARCS have significant specialist and real time software and engineering experience in the application of innovative technology solutions to solve difficult problems.

ARCS were recently appointed in the role of client representative for the commissioning & integration of the Perth City Underground Bus Port project (team of 5 engineers) for the Public Transport Authority of WA. This required expertise in HVAC, vertical transport, fire, hydraulics, BMS controls, ventilation, CCTV, communication, Passenger services information displays, IT and technology in general including sound knowledge of how to commissioning, ITPs and records management.

ARCS also under took the same role for the sinking of the Public Transport Authority of WA’s Fremantle line (including the pedestrian walkway, with 6 escalators, and 3 lifts) and earlier works on the Perth Underground City Station network which were again of a similar nature.

ARCS also have extensive experience in real time systems software and system integration including SCADA, train control, asset monitoring, passenger information, signalling, CCTV and other related disciplines within the rail and other industries

and have extensive experience in applied technology and instrumentation in many engineering fields.

## 1.2 WHO YOU MEET IS WHO DOES THE WORK

ARCS's other key differentiator is that the people that the client meets during the tender process are the people who will oversee and participate in the work. This is rarely true of other companies.

## 1.3 THE ARCS GROUP'S OFFICES

ARCS have offices in Brisbane, Perth and Melbourne.

## 1.4 TRUSTED STRATEGIC PARTNERS

ARCS have a number of trusted strategic partners which supplement ARCS skills. Specifically, ARCS uses Gravelroad for specialised telecommunications advice.



## 2. PUBLIC TRANSPORT AUTHORITY OF WA

### 2.1 BUSPORT TECHNOLOGY COMMISSIONING & INTEGRATION

<ul style="list-style-type: none"> <li>• <b>Project Name:</b></li> <li>• <b>Project Location:</b></li> <li>• <b>Project/Description:</b></li> </ul>	<p><b>Perth Transport Authority – Busport Commissioning</b></p> <p>Perth, WA</p> <p>Perth underground Busport Commissioning Support ARCS were engaged to provide specialist commissioning support for all technology systems in the new underground Perth Busport. The work included fire and life safety, ventilation, mechanical services, SCADA, IT, radio, CCTV and security, access control and all related systems.</p> <p>The work is ongoing.</p>
<p><i>Key Parties Involved:</i></p> <p><i>Contract Form:</i></p> <p><i>Referee:</i></p>	<p>PTA, Brookfield Multiplex Nilsen’s, E80, DVL, Wood and Grieve Project Superintendency/Consultancy</p> <ul style="list-style-type: none"> <li>• PTA Project Implementation Manager - Mr Brian Blagaich, ☎ 089326 2506</li> </ul>


### 2.2 PASSENGER INFORMATION SYSTEM IMPLEMENTATION, SUPPORT AND MAINTENANCE

<ul style="list-style-type: none"> <li>• <b>Project Name:</b></li> <li>• <b>Project Location:</b></li> <li>• <b>Project/Description:</b></li> </ul>	<p><b>Perth Transport Authority – Passenger Information System Implementation, Support and Maintenance</b></p> <p>Perth, WA</p> <p>Passenger Information System</p> <p>In 2004, the existing PTA passenger information system was dated and prone to poor availability and difficult maintenance, and as a result the replacement of the system was included as part of the works. The decision to undertake this work in-house was taken following a prototyping exercise which confirmed that a simple process of comparing the train timetable to current train locations and annunciating the difference at station platforms was reliable.</p> <p>ARCS designed the architecture, the hardware, the software, and implemented and rolled out the system and have been maintaining this system for over 13 years. During the period between the initial rollout, ARCS have developed interfaces to:</p> <ul style="list-style-type: none"> <li>• Audio loops (AFILS)</li> <li>• Content Management Systems such as SCALA</li> <li>• Bespoke displays (LED custom)</li> <li>• TV/Monitor screens</li> <li>• Industrial Monitors</li> <li>• Audio interfaces</li> <li>• Web based information systems</li> </ul> <p>The work is ongoing.</p>
<p><i>Key Parties Involved:</i></p> <p><i>Contract Form:</i></p> <p><i>Referee:</i></p>	<p>PTA, ARCS Design and Support</p> <p>PTA Project Implementation Manager - Mr Brian Blagaich, ☎ 089326 2506</p>

### 2.3 FREMANTLE BRIDGE EARLY WARNING SYSTEM IMPLEMENTATION, SUPPORT AND MAINTENANCE

• Project Name:	Perth Transport Authority – Passenger Information System Implementation, Support and Maintenance
• Project Location:	Perth, WA
• Project/Description:	<p>Fremantle Bridge Early Warning System</p> <p>PTA were having increased numbers of incidents on the Fremantle bridge where large vessels drifted into and impacted the bridge damaging infrastructure, delaying trains and putting lives at risk.</p> <p>ARCS designed the architecture, the hardware, the software, implemented and rolled out an early warning detection system which detected large vessels drifting towards the bridge. The system incorporates time of flight lasers, accelerometers providing alerts and warnings to PTA and Fremantle Ports and incorporates cameras to view and manage the incident.</p> <p>ARCS currently maintain and supports the system.</p> <p>The work is ongoing.</p>
<i>Key Parties Involved:</i>	PTA, ARCS
<i>Contract Form:</i>	Design and Support
<i>Referee:</i>	PTA Project Implementation Manager - Mr Brian Blagaich, ☎ 089326 2506

## 2.4 OPERATIONAL TRAIN CONTROL RESILIENCE PROGRAM

• <b>Project Name:</b>	<b>Perth Transport Authority – Operational Train Control System and Alternate Train Control Facility upgrade</b>
• <b>Project Location:</b>	Perth, WA
• <b>Project/Description:</b>	<p>ARCS were the technical consultants for the PTA Operational Train Control System and Alternate Train Control Facility upgrade as part of PTA’s resilience program. ARCS were responsible for the hardware and software specification, design and implementation of the system which will allow Train Control and Traction Power SCADA operations to seamlessly continue at the ATCF in the event of an incident at the primary Train Control Centre</p> <p>The resilience program is designed to reduce the incidence of system failures and also allow for faster recovery in the event of system failure. ARCS were engaged to undertake all technical works associated with the upgrading of the main train control system, the alternative train control facility and the Traction SCADA system.</p> <p>The upgrade/enhancement of the operational systems infrastructure was conducted over a 16 month period. These activities increased resilience and reduced the vulnerability of disruptions to the rail network by providing a more effective ATCF, improved fault tolerance and enabled the systems for future replication to other alternate sites.</p> <p>The work is complete.</p> <p><i>Key Parties Involved:</i> PTA, ARCS  <i>Contract Form:</i> Technical Consultancy and Design  <i>Referee:</i> PTA Project Implementation Manager - Mr Brian Blagaich,   089326 2506</p>


## 2.5 SINKING OF THE FREMANTLE LINE TECHNOLOGY COMMISSIONING & INTEGRATION

• <b>Project Name:</b>	<b>Perth Transport Authority – Commissioning of the Fremantle line Monitoring Room</b>
• <b>Project Location:</b>	Perth, WA
• <b>Project/Description:</b>	<p>Sinking Fremantle Line through the Perth Precinct</p> <p>ARCS were engaged to provide specialist commissioning support for all technology systems in the new underground Perth Busport. The work included fire and life safety, ventilation, mechanical services, SCADA, IT, radio, CCTV and security, access control and all related systems.</p> <p>The work is complete.</p>
<i>Key Parties Involved:</i>	PTA, Woodhead, DRML, John Holland
<i>Contract Form:</i>	Project Superintendency/Consultancy and Design
<i>Referee:</i>	<ul style="list-style-type: none"> <li>• PTA Project Implementation Manager - Mr Brian Blagaich, ☎ 089326 2506</li> </ul>



## 2.6 PUBLIC TRANSPORT AUTHORITY - RELOCATION OF THE CENTRAL MONITORING ROOM

• <b>Project Name:</b>	<b>Perth Transport Authority - Relocation of the Central Monitoring Room</b>
• <b>Project Location:</b>	Perth, WA
• <b>Project/Description:</b>	<p>ARCS are involved in technical design and superintendence of the construction of the new Central Monitoring Room for PTA.</p> <p>The work involved the co-ordination of multiple work groups and contractors to introduce a new Centrally Monitoring facility. The work required the management of the migration of the exiting and full operational facility Perth Station based centre to the new centre in East Perth, whilst effectively having <b>no</b> down time. The work included considerable interface management.</p> <p>The work included the technology design of the new room including commission and commissioning support.</p> <p>The work is complete.</p>
<i>Key Parties Involved:</i>	PTA, Woodhead, DRML, AECOM, HBS
<i>Contract Form:</i>	Project Superintendency/Consultancy and Design
<i>Referee:</i>	<ul style="list-style-type: none"> <li>• PTA Project Implementation Manager - Mr Brian Blagaich, ☎ 089326 2506</li> </ul>

## 2.7 PUBLIC TRANSPORT AUTHORITY - FREEWAY INTRUSION DETECTION

<ul style="list-style-type: none"> <li>• <b>Project Name:</b></li> <li>• <b>Project Location:</b></li> <li>• <b>Project/Description:</b></li> </ul>	<p><b>Public Transport Authority – Freeway Intrusion Detection</b></p> <p>Perth, WA</p> <p>ARCS were involved in the proto-typing of a fibre based Michelson interferometer system to detect the ingress of objects from the road reserve to the rail reserve.</p> <p>The prototype is complete and proved successful. The result are now being considered by the WA government for funding.</p>
<p><i>Key Parties Involved:</i></p> <p><i>Contract Form:</i></p> <p><i>Value:</i></p> <p><i>Referee:</i></p>	<p>PTA, Fast Fibre Technologies</p> <p>Project Engineering, Design and Management</p> <p>The total value of the project is approximately \$100K</p> <p>PTA Project Implementation Manager - Mr Brian Blagaich,   089326 2506</p>

## 2.8 PERTH TRANSPORT AUTHORITY - PTA PERTH UNDERGROUND TUNNEL CCTV MONITORING

<ul style="list-style-type: none"> <li>• <b>Project Name:</b></li> <li>• <b>Project Location:</b></li> <li>• <b>Project/Description:</b></li> </ul>	<p><b>Perth Transport Authority – PTA Perth Underground Tunnel CCTV Monitoring</b></p> <p>Perth, WA</p> <p>ARCS have completed preparing the preliminary design (15% design) for the installation of IP based cameras to monitor incidents and fire safety in the Perth railway underground tunnel precinct.</p> <p>This project is part of a rail safety initiative and safety overlay to allow the management of tunnel fires and evacuations and is to be extended to the future Perth City Link tunnels.</p> <p>The first stage of this work involves a preliminary design followed by a full prototype and proof of concept of the proposed system.</p> <p>The work involves market review, design, documentation and project management of the final contract.</p> <p>The work has just commenced and contemplates IP based cameras.</p>
<p><i>Key Parties Involved:</i></p> <p><i>Contract Form:</i></p> <p><i>Value:</i></p> <p><i>Referee:</i></p>	<p>PTA,</p> <p>Project Engineering and Management Consultancy</p> <p>The total value of the project is currently being determined</p> <p>PTA General Manager Network and Infrastructure - Mr Kim Stone,   089326 2871</p> <p>PTA Project Implementation Manager - Mr Scott La Vertu,   089326 2506</p>

## 2.9 PERTH TRANSPORT AUTHORITY - MRWA/PTA SOUTHERN FREEWAY CCTV MONITORING

• <b>Project Name:</b>	<b>Perth Transport Authority – MRWA/PTA Southern Freeway CCTV Monitoring</b>
• <b>Project Location:</b>	Perth, WA
• <b>Project/Description:</b>	<p>ARCS have completed the design, implementation and handover of the rollout of a combined corridor CCTV monitoring capability for the Southern Railway/Freeway involving 100 cameras. This project is a joint initiative of the WA Main Roads and PTA and is part of a rail safety initiative to detect intrusions into the rail reserve.</p> <p>The work has involved significant interface management between local authorities, MRWA, PTA, Western Power and environmental agencies. The work extends between the Narrows Bridge to the Anketell Tunnel.</p> <p>The work complete.</p>
<i>Key Parties Involved:</i>	PTA, MRWA
<i>Contract Form:</i>	Project Engineering and Management Consultancy
<i>Value:</i>	The total value of the project is approximately \$3M
<i>Referee:</i>	<ul style="list-style-type: none"> <li>• PTA General Manager Network and Infrastructure - Mr Kim Stone, ☎ 089326 2871</li> <li>• PTA Project Implementation Manager - Mr Scott La Vertu, ☎ 089326 2506</li> <li>• MRWA Project Manager - Mr Bob Manhood ☎ 0417 182 185</li> </ul>

## 2.10 DEVELOPMENT OF THE PTA'S NETWORK SYSTEMS ASSET MANAGEMENT PLAN.


<b>Project Name:</b>	<b>Development of the PTA's Network Systems Asset Management Plan.</b>
<b>Project Location:</b>	Perth, WA
<b>Project/Description:</b>	<p>ARCS were engaged by the PTA to facilitate and assist in the preparation of the Asset Management Plan for the PTA's Network Systems Infrastructure.</p> <p>The work included identifying assets and asset condition, creating the framework and plan structure in accordance with PASS 55, gathering requirements, conduct management briefings and facilitated workshops, prepare of draft plans and documentation, development of maintenance and financial plans for each asset type and project management.</p> <p>ARCS also provided the PTA with strategic technical advice and planning for the future directions of the network systems infrastructure.</p>
<i>Key Parties Involved:</i>	PTA
<i>Contract Form:</i>	Consultancy
<i>Value:</i>	Confidential
<i>Referee:</i>	Hugh Smith Executive Director Strategic Asset Management Development Public Transport Authority of Western Australia T (08) 9326 2686

## 2.11 DEVELOPMENT OF THE PTA'S COMMUNICATIONS NETWORK ASSET MANAGEMENT PLAN

<b>Project Name:</b>	<b>Development of the PTA's Communications Network Asset Management Plan.</b>
<b>Project Location:</b>	Perth, WA
<b>Project/Description:</b>	<p>ARCS were engaged by the PTA to facilitate and assist in the preparation of the Asset Management Plan for the PTA's Communications Infrastructure.</p> <p>The work included identifying assets and asset condition, creating the framework and plan structure in accordance with PASS 55, gathering requirements, conduct management briefings and facilitated workshops, prepare of draft plans and documentation, development of maintenance and financial plans for each asset type and project management.</p> <p>ARCS also provided the PTA with strategic technical advice and planning for the future directions of the communication network.</p>
<i>Key Parties Involved:</i>	PTA
<i>Contract Form:</i>	Consultancy
<i>Value:</i>	Confidential
<i>Referee:</i>	Hugh Smith Executive Director Strategic Asset Management Development


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T (08) 9326 2686

## 2.12 PERTH TRANSPORT AUTHORITY - 32 DAY NAS STORAGE UPGRADE


<ul style="list-style-type: none"><li>• <b>Project Name:</b></li><li>• <b>Project Location:</b></li><li>• <b>Project/Description:</b></li></ul>	<p><b>Perth Transport Authority – 32 Day Storage Upgrade</b></p> <p>Perth, WA</p> <p>ARCS were involved in the management and technical advice for upgrade of the Central Monitoring Storage system from 7 days to 32 day storage capability. The project involved the introduction of a 4PB SAN and virtualisation of server applications.</p> <p>This work was technically complex and involved the reduction of some 72 camera servers to 6 using virtualisation (VMWare) Servers.</p> <p>The work is complete.</p>
<p><i>Key Parties Involved:</i></p> <p><i>Contract Form:</i></p> <p><i>Value:</i></p> <p><i>Referee:</i></p>	<p>PTA, Direct Digital Networks, IBM, Honeywell Business Systems Project Engineering and Management Consultancy</p> <p>The total value of the project is approximately \$3M</p> <ul style="list-style-type: none"><li>• PTA Project Implementation Manager - Mr Brian Blagaich,  089326 2506</li></ul>



### 2.13 RETESTING AND INTEGRATION OF THE PERTH UNDERGROUND COMPLEX TUNNEL CONTROL SYSTEMS INCLUDING FIRE PROTECTION

<ul style="list-style-type: none"> <li>• <b>Project Name:</b></li> </ul>	<b>Public Transport Authority – Retesting and Integration of the Perth Underground Complex Tunnel Control Systems including Fire Protection</b>
<ul style="list-style-type: none"> <li>• <b>Project Location:</b></li> <li>• <b>Project/Description:</b></li> </ul>	<p>Perth, WA</p> <p>ARCS undertook the technical review, commissioning and retesting of the Tunnel Control System for PTA as a requirement of the PTA Rail Safety confirmation both prior to opening the PUG and following the opening.</p> <p>Much of the retesting and commissioning was done while the railway was fully operational</p> <p>The work is complete.</p>
<p><i>Key Parties Involved:</i></p> <p><i>Contract Form:</i></p> <p><i>Value:</i></p> <p><i>Referee:</i></p>	<p>PTA, United Group, LKJV, Schneider</p> <p>Project Engineering. Commissioning, Consultancy</p> <p>The total value of the project is approximately \$1.0M</p> <ul style="list-style-type: none"> <li>• PTA Project Implementation Manager - Mr Brian Blagaich,  089326 2506</li> </ul>

### 2.14 TRAIN CONTROL SYSTEM CONTRACT SUPERINTENDENCE

<ul style="list-style-type: none"> <li>• <b>Project Name:</b></li> </ul>	<b>Public Transport Authority - Train Control System Contract Superintendence</b>
<ul style="list-style-type: none"> <li>• <b>Project Location:</b></li> <li>• <b>Project/Description:</b></li> </ul>	<p>Perth, WA</p> <p>ARCS are involved in the superintendency and technical advice for the Train Control System works for the PTA being installed and commissioned in the PTC in East Perth. The train control system interfaces to the entire PTA urban area including the New Metro Rail Project. The project also includes the provision of Train Control, Train Planning and Scheduling, Customer Information Systems and associated field works.</p> <p>The facility was fully commissioned in 2008 but ongoing due to the SSR and PICL works.</p>
<p><i>Key Parties Involved:</i></p> <p><i>Contract Form:</i></p> <p><i>Value:</i></p> <p><i>Referee:</i></p>	<p>PTA, NMR, Ansaldo STS</p> <p>Project Superintendency/Consultancy</p> <p>The total value of the project is approximately \$10M</p> <ul style="list-style-type: none"> <li>• PTA Project Implementation Manager - Mr Brian Blagaich,  089326 2506</li> </ul>

## 2.15 URBAN SECURITY INITIATIVES PROJECT (USIP)

<b>• Project Name:</b>	<b>Public Transport Authority - Security Initiatives Project USIP</b>
<b>• Project Location:</b>	Perth, WA
<b>• Project/Description:</b>	<p>ARCS were engaged by the WAGR to project manage the introduction of a number of security initiatives to the urban passenger network. The work involved the provision of:</p> <ul style="list-style-type: none"> <li>• Replacement of the Passenger Information System</li> <li>• Implementation of the Long Line Public Address System</li> <li>• Introduction of WAN/LAN fibre backbone for the system, including a 1Ge network across all urban stations.</li> <li>• Digital CCTV monitoring network with Central Management.</li> <li>• Barrier gates and fencing</li> <li>• Improvements to station lighting and electrical systems</li> </ul> <p>The work was complementary to the Control and Train Information Project and involved identifying client requirements, preparation of RFT documentation, calling of tender, tender evaluation, project management and superintendence. Currently tenders are being evaluated for some work packages.</p> <p>This project was awarded both the Category Engineering best Project Award and the Overall Best Engineering award by the Institute of Engineers Aust (WA) in 2006. It also received 9 other engineering awards</p> <p>The work is complete.</p>
<i>Key Parties Involved:</i>	PTA and WA Police
<i>Contract Form:</i>	Project Manager/Consultancy
<i>Value:</i>	The total value of the work is approximately \$30M
<i>Referee:</i>	<ul style="list-style-type: none"> <li>• PTA Infrastructure Systems Manager - Mr Phil Schubert, ☎ 089326 2506</li> <li>• PTA General Manager Network and Infrastructure - Hugh Smith ☎ 93262686</li> </ul>

## 2.16 DEVELOPMENT OF THE PTA'S CONTROL SYSTEMS ASSET MANAGEMENT PLAN

<b>Project Name:</b>	<b>Development of the PTA's Control Systems Asset Management Plan.</b>
<b>Project Location:</b>	<b>Perth, WA</b>
<b>Project/Description:</b>	<p>ARCS were engaged by the PTA to facilitate and assist in the preparation of the Asset Management Plan for the PTA's Control Systems Infrastructure.</p> <p>The work included identifying assets and asset condition, creating the framework and plan structure in accordance with PASS 55, gathering requirements, conduct management briefings and facilitated workshops, prepare of draft plans and documentation, development of maintenance and financial plans for each asset type and project management.</p> <p>ARCS also provided the PTA with strategic technical advice and planning for the future directions of the control systems infrastructure and technology.</p>
<i>Key Parties Involved:</i>	PTA
<i>Contract Form:</i>	Consultancy
<i>Value:</i>	Confidential
<i>Referee:</i>	Hugh Smith Executive Director Strategic Asset Management Development Public Transport Authority of Western Australia T (08) 9326 2686

### 3. METRONET PERTH WA

#### 3.1 METROCONNEX CONSORTIUM

• <b>Project Name:</b>	<b>MetroConnex Consortium</b>
• <b>Project Location:</b>	WA
• <b>Project/Description:</b>	ARCS were part of the MetroConnex consortium for the design, construction and commissioning of the new Perth MetroNet Railway including: Development of the staging, construction and commissioning Planning Station Services design, planning, costing, construction and commissioning of the station services (PIN, CCTV, SCADA, Communications etc) Bayswater Station Grade Separation
<i>Key Parties Involved:</i>	ARCS, Coleman Rail, MetroConnex consortium
<i>Contract Form:</i>	Jason Johnson Coleman Rail
<i>Referee:</i>	Phone 0417 763 618

## 4. FORRESTFIELD AIRPORT LINK PERTH WA

### 4.1 STATION SERVICES

• <b>Project Name:</b>	<b>Forrestfield Airport Link</b>
• <b>Project Location:</b>	Perth WA
• <b>Project/Description:</b>	ARCS have been engaged to design, construction and commissioning of the station services for the new Forrestfield Airport Link as part of the Perth MetroNet Railway including: Development of the staging, construction and commissioning Planning Station Services design, planning, costing, construction and commissioning of the station services (PIN, CCTV, SCADA, Communications etc)
<i>Key Parties Involved:</i>	ARCS, DVL
<i>Contract Form:</i>	Graham Lane
<i>Referee:</i>	Phone 0419 042 684

## 5. SYDNEY TRAINS

### 5.1 SYDNEY TRAINS - FEEDER CABLE MONITORING SYSTEM (CMS) - STAGE 1

<ul style="list-style-type: none"><li>• <b>Project Name:</b></li><li>• <b>Project Location:</b></li><li>• <b>Project/Description:</b></li></ul>	<b>Sydney Trains – Feeder Cable Monitoring System (CMS) – Stage 1</b> NSW Sydney Trains owns and operates the NSW passenger railway network in NSW. The ARCS Group expanding the existing CMS system to include current monitoring to 24 feeder cables across 9 substations. The works involves redesigning the CMS to incorporate current monitoring, installing hall effect current transducer each of the selected feeder cables and a site PLC, interfacing temperature monitoring system and current transducers to the PLC, redesigning the webserver and final testing and commissioning. The system was commissioned in Jan 2015.
<i>Key Parties Involved:</i> <i>Contract Form:</i>	ARCS, Sydney Trains Anh Nguyen Project Manager Electrical Reliability Network Maintenance Division Sydney Trains
<i>Referee:</i>	Phone 0435 510 665

## 5.2 SYDNEY TRAINS - FEEDER CABLE MONITORING SYSTEM (CMS) - STAGE 2

• <b>Project Name:</b>	<b>Sydney Trains – Feeder Cable Monitoring System (CMS) – Stage 2</b>
• <b>Project Location:</b>	NSW
• <b>Project/Description:</b>	<p>Sydney Trains owns and operates the NSW passenger railway network in NSW.</p> <p>Sydney Trains (ST) identified increased load on the High Voltage (HV) feeder cables supplying their rail network and as a result ST has identified a risk of excessive temperatures in the copper core of these feeder cables during high ambient temperatures and current loads.</p> <p>To understand this risk ST initially installed “stick-on” thermometers to these feeder cables at a number of strategic locations in the rail network. This provided ST with an indication of the feeder cable sheath temperatures but had the limitation of having to be manually monitored during periods of high ambient temperature. To better understand these temperature risks over the summer months and a typical day’s operation ST engaged ARCS to implement a temperature monitoring system which could remotely measure feeder cables temperatures at 5 high risk locations, predict core temperature and gather and store historical data for further analysis. ST selected the five high risk locations of Chatswood North, Granville, Cowan, Gordon and Hornsby and the project was to be fast-tracked. Whilst the Sydney Trains processes were being implemented, ARCS undertook a series of design workshops to develop a theoretical model and a series of empirical tests to verify that the model worked in practice.</p>
<i>Key Parties Involved:</i>	The CMS system was commissioned in Nov / Jan 2014.
<i>Contract Form:</i>	ARCS, Sydney Trains Anh Nguyen Project Manager Electrical Reliability Network Maintenance Division Sydney Trains
<i>Referee:</i>	Phone 0435 510 665

## 6. ARC INFRASTRUCTURE

### 6.1 ENHANCED NETWORK CONTROL PROJECT (IN PROCESS)

<ul style="list-style-type: none"><li>• <b>Project Name:</b></li><li>• <b>Project Location:</b></li><li>• <b>Project/Description:</b></li></ul>	<p><b>ARC Infrastructure - Enhanced Network Control Project (ENCP)</b></p> <p>Western Australia</p> <p>ARCS are engaged by Arc Infrastructure (Brookfield Rail) as their technical and commercial specialist consultants for the early works and feasibility study for the ENCP (Project Ablett).</p> <p>ARCS is providing Arc Infrastructure advice and assistance in the sign off of the requirements, developed the methodology for the negotiation of the Train Control System design, supply, testing and commissioning contract including the following activities and responsibilities:</p> <ul style="list-style-type: none"><li>• Establishing Project Requirements</li><li>• Preparing RFI documentation</li><li>• Client Workshops</li><li>• Risk and Technical Workshops</li><li>• Development of the Concept of Operations</li><li>• Preparation of RFT documentation</li><li>• Commercial Delivery Models</li><li>• Tender Evaluation Models</li><li>• Technical specialist</li></ul> <p>This includes conducting and facilitating risk assessments, the preparation of a business case, preparation of an operational concept and preliminary design, preparation of detailed Principal's Project Requirements and contract documentation, recommendations on specific functional and various project matters and implementation support and advice.</p> <p>ENCP Project is seeking to:</p> <ul style="list-style-type: none"><li>• Improve safety on the railway by providing visibility of trains and maintenance vehicles in dark territory;</li><li>• Unlock capacity by increasing throughput in high traffic areas;</li><li>• Reduce delays associated with the issue of authorities;</li><li>• Reduce operating costs through the removal of signal infrastructure.</li></ul> <p>ENCP Phase 1A (Integrated Rail Operations System - IROS) is currently underway. This phase will implement a new train control system with electronic train graph and automatic route setting, movement planning tool and a track worker protection system;</p> <p><i>Key Parties Involved:</i> ARCS, ARC Infrastructure <i>Contract Form:</i> Adrian D'Vauz ENCP Project Manager <i>Referee:</i> Phone 0459 863 112</p>
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## 6.2 INTEGRATED OPERATIONS CENTRE PROJECT (IN PROCESS)

<ul style="list-style-type: none"><li>• <b>Project Name:</b></li><li>• <b>Project Location:</b></li><li>• <b>Project/Description:</b></li></ul>	<p><b>ARC Infrastructure – Integrated Operations Centre (IOC)</b></p> <p>Western Australia</p> <p>ARCS are engaged by Arc Infrastructure (Brookfield Rail) as specialist technical consultants for the design and implementation of a new Integrated Operations Centre.</p> <p>ARCS is delivering this project over a number of stages:</p> <p>Stage 1: Development of a high-level Concept of Operations for IOC and DR Facility.</p> <p>Stage 2: High level evaluation of all the options including considering the following:</p> <ul style="list-style-type: none"><li>• Pros and cons</li><li>• Operational and Resource Implications</li><li>• Technical Implications</li><li>• Supporting Infrastructure Constraints</li><li>• Commercial and Regulatory Issues</li><li>• Other Considerations</li></ul> <p>Stage 3: Selection and development of the preferred option(s) including:</p> <ul style="list-style-type: none"><li>• Centre Concept Design</li><li>• Room Layout and Facilities Concept Design</li><li>• Technology Design and Fit-out Design</li><li>• Supporting Infrastructure Design and Requirements</li></ul> <p>Stage 4: Development of an Implementation and Transition Strategy</p> <p>Stage 5: Development of a high-level business case including:</p> <ul style="list-style-type: none"><li>• Itemised Costings for the preferred options</li><li>• Costed Benefits</li><li>• Recommendation and way forward</li></ul> <p><i>Key Parties Involved:</i> ARCS, ARC Infrastructure</p> <p><i>Contract Form:</i> Adrian D’Vauz ENCP Project Manager</p> <p><i>Referee:</i> Phone 0459 863 112</p>
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### 6.3 WESTNET RAIL - TRAIN CONTROL CENTRALISATION PROJECT

• <b>Project Name:</b>	<b>WestNet Rail - Train Control Centralisation Project</b>
• <b>Project Location:</b>	Perth, WA
• <b>Project/Description:</b>	<p>ARCS managed the centralisation of WestNet Rail's (now Brookfield Rail) 5 disparate Train Control Centres into a single fully managed train control centre with a number of different back up centres.</p> <p>ARCS were involved in the development of the centralisation of train control including the communication topology, the radio bus arrangements and the commissioning strategies and requirements. The main contract was managed by ARCS with all other ancillary works undertaken by ARCS.</p> <p>The project included the extension of the existing Train Control System (Phoenix), the decommissioning of the existing train control systems (Paragon), the installation of a new train order system (Phoenix TOS) and the installation of new associated field works at selected locations throughout the state.</p> <p>The work is complete.</p>
<i>Key Parties Involved:</i>	WNR, Ansaldo STS , ARCS
<i>Contract Form:</i>	Project Superintendency/Consultancy
<i>Value:</i>	Confidential
<i>Referee:</i>	Control and Communications Manager - Mr John Ursic, ☎ 0411 884 575

### 6.4 WESTNET RAIL - DEVELOPMENT OF A STRATEGIC PLAN FOR TRAIN CONTROL AND OPERATIONAL SYSTEMS

<b>Project Name:</b>	<b>WestNet Rail, Development of a Strategic Plan for Train Control and Operational Systems.</b>
<b>Project Location:</b>	Perth, WA
<b>Project/Description:</b>	<p>ARCS are engaged by WestNet Rail to provide technical advice, strategic planning and management for the development of a Strategic Plan for WestNet Rail Train Control and Operational Systems</p> <p>The work included identifying assets and asset condition, creating the framework and plan structure, gathering requirements, conduct management briefings and facilitated workshops, prepare of draft plans and documentation, development of maintenance and financial plans for each asset type and project management.</p> <p>ARCS also provided WestNet Rail with strategic technical advice and planning for the future directions of the train control and operational systems infrastructure and technology.</p> <p>The work is complete.</p>
<i>Key Parties Involved:</i>	WestNet Rail
<i>Contract Form:</i>	Project Manager/Consultancy
<i>Value:</i>	Confidential
<i>Referee:</i>	WestNet Rail Control and Communications Manager - Mr John Ursic, ☎ 0411 884 575

## 6.5 BROOKFIELD - GPS TRACKING SYSTEM

<ul style="list-style-type: none"><li>• <b>Project Name:</b></li><li>• <b>Project Location:</b></li><li>• <b>Project/Description:</b></li></ul>	<p><b>Brookfield – GPS Tracking System</b></p> <p>Western Australia</p> <p>Brookfield Rail, the freight railway network owner and manager in Western Australia, has seen the incidence of near miss accidents involving track vehicles to track vehicles and track vehicle to trains as well as an increase in safeworking breaches involving wrongly reporting their location steadily increasing over the past few years.</p> <p>ARCS were given the task to implement a GPS Interface, Tracking and Monitoring System (GPS ITAMS) so train controllers could monitor the location of all rail vehicles on the freight network at any time. The client also wanted to be informed of the vehicles status for items such as, on track detection, roll over detection, ignition on, velocity, vigilance and be made aware of potential risks and safeworking breaches thereby reducing incidence of accidents and incidents.</p> <p>The ARCS GPS ITAM System has the following features:</p> <ul style="list-style-type: none"><li>• Graphical User Interface</li><li>• GPS tracking of all GPS fitted rail vehicles (trains and high rails etc)</li><li>• Spatial / Geographical view of the rail network</li><li>• Track Network / Station Layout (sketch) views of the rail network</li><li>• Hi Rail Vehicle Alarms</li><li>• Hi Rail Status monitoring, including direction, velocity, position</li><li>• Hi Rail Vigilance monitoring</li><li>• Logging and Reporting Functionality</li><li>• AutoCAD import for custom spatial map view layouts</li><li>• Server/Client software architecture</li></ul> <p>The GPS ITAM system is in the final development and testing phase and is due for implementation in March 2013</p> <p><i>Key Parties Involved:</i> ARCS, Brookfield Rail <i>Contract Form:</i> Control and Communications Manager - Mr John Ursich, <i>Referee:</i> Phone 0411 884 575</p>
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## 6.6 WESTNET RAIL – TRAIN CONTROL CENTRE CCTV & SECURITY SYSTEM

<ul style="list-style-type: none"> <li>• <b>Project Name:</b></li> <li>• <b>Project Location:</b></li> <li>• <b>Project/Description:</b></li> </ul>	<p><b>WestNet Rail – Train Control Centre CCTV &amp; Security System</b></p> <p>Perth, WA</p> <p>ARCS managed the design and implementation of a CCTV to monitor WestNet Rail's (now Brookfield Rail) Train Control Centres. For disparate infrastructure such as relay and communication centres across the state.</p> <p>The main contract was managed by ARCS with all other ancillary works undertaken by ARCS.</p> <p>The project included the installation of CCTV capability at all critical centres for monitoring and surveillance.</p> <p>The work is complete.</p>
<p><i>Key Parties Involved:</i></p> <p><i>Contract Form:</i></p> <p><i>Value:</i></p> <p><i>Referee:</i></p>	<p>WNR</p> <p>Project Consultancy</p> <p>Confidential</p> <p>WestNet Rail Control and Communications Manager - Mr John Ursich,   0411 884 575</p>

## 6.7 WESTNET RAIL TRAIN CONTROL SYSTEM CONTRACT SUPERINTENDENCE (PBI PROJECT)

<ul style="list-style-type: none"> <li>• <b>Project Name:</b></li> <li>• <b>Project Location:</b></li> <li>• <b>Project/Description:</b></li> </ul>	<p><b>WestNet Rail Train Control System Contract Superintendence (PBI Project)</b></p> <p>Perth, WA</p> <p>ARCS were involved in the superintendency of the Train Control System works for the new Freight Control system being installed and commissioned in the Westrail centre in East Perth. The train control system interfaces to new processor based Interlocking in the entire WestNet Rail Freight area and is the 1<sup>st</sup> installation of PBI on existing network.</p>
<p><i>Key Parties Involved:</i></p> <p><i>Contract Form:</i></p> <p><i>Value:</i></p> <p><i>Referee:</i></p>	<p>WAGR, WestNet Rail ARG, MHM Engineering, Union Switch and Signal</p> <p>Project Superintendency/Consultancy</p> <p>The total value of the project is approximately \$20M</p> <p>WestNet Control and Communications Manager - Mr John Ursich,   Phone 0411 884 575</p>

## 6.8 WESTNET RAIL, AUDIT OF CURRENT CATOS SYSTEMS INCLUDING PREPARATION OF THE SPECIFICATION FOR THE REPLACEMENT OF THE SYSTEM

<ul style="list-style-type: none"><li>• <b>Project Name:</b></li></ul>	<b>WestNet Rail, Audit of current CATOS Systems including preparation of the specification for the replacement of the system</b>
<ul style="list-style-type: none"><li>• <b>Project Location:</b></li></ul>	Perth, WA
<ul style="list-style-type: none"><li>• <b>Project/Description:</b></li></ul>	<p>ARCS were engaged by WestNet Rail to conduct an audit of the current CATOS, provide technical advice, strategic planning and management for the development of the specification for the replacement this system.</p> <p>The work involves identifying client requirements, client agreement and sign-off, preparation of documentation, management of estimates, evaluation, project management and superintendence.</p> <p>The work is complete</p>
<i>Key Parties Involved:</i>	WestNet Rail
<i>Contract Form:</i>	Project Manager/Consultancy
<i>Value:</i>	Confidential
<i>Referee:</i>	WestNet Rail Control and Communications Manager - Mr John Ursich, ☎ Phone 0411 884 575

## 7. VLINE

### 7.1 TRAIN OPERATIONS MANAGEMENT PROJECT

<ul style="list-style-type: none"><li>• <b>Project Name:</b></li><li>• <b>Project Location:</b></li><li>• <b>Project/Description:</b></li></ul>	<p><b>VLine – Train Operations Management Project (TOM)</b></p> <p>Victoria</p> <p>ARCS are engaged by VLine as their technical and commercial specialist consultants for the early works and feasibility study for the TOM.</p> <p>ARCS provided VLine advice and assistance in the sign off of the requirements, strategic vision, business case and procurement methodology for the design and deployment of a new Train Control System.</p> <p>This included conducting and facilitating risk assessments, the preparation of a business case, preparation of an operational concept and preliminary design, preparation of detailed Principal’s Project Requirements and contract documentation, recommendations on specific functional and various project matters and implementation support and advice.</p>
<p><b>Key Parties Involved:</b></p> <p><b>Contract Form:</b></p> <p><b>Value:</b></p> <p><b>Referee:</b></p>	<p>ARCS, VLine</p> <p>Consultancy</p> <p>Confidential</p> <p>Colin Taylor</p> <p>Phone 0438 567 780</p>

## 8. CROSS RIVER RAIL PROJECT BRISBANE

### 8.1 CENTRIQ PARTNERSHIPS

<b>Project Name:</b>	<b>CentriQ - Systems Engineering</b>
<b>Project Location:</b>	Brisbane
<b>Project/Description:</b>	<p>ARCS are engaged by the CentriQ Partnership as their specialist systems engineering consultants for project.</p> <p>ARCS provided technical and systems engineering advice and assistance in the development of entire system engineering strategy and documentation including, system requirements, testing, verification and validation, risk assessment, etc.</p> <p>This included the preparation of:</p> <ul style="list-style-type: none"><li>o Systems Engineering and Systems Assurance strategy plan</li><li>o Maintainability Strategy plan</li><li>o Systems Engineering and Systems Assurance Teams and key Personnel</li><li>o Key Documentation including:<ul style="list-style-type: none"><li>» Doors Compliance Matrix</li><li>» Draft Requirements Traceability Matrix</li><li>» Initial Hazard Log</li><li>» Initial Ram Log</li><li>» Draft Goal Structuring Notation</li><li>» System Breakdown Structure</li><li>» Draft VCRM</li></ul></li><li>o Key Analysis<ul style="list-style-type: none"><li>» Preliminary Hazard Analysis Report</li><li>» Early Human Factors Analysis Report</li><li>» Early RAM Analysis Report.</li></ul></li><li>· Configuration Management Plan Strategy</li><li>· Requirements Management Plan Strategy</li><li>· Verification and Validation Management Plan Strategy</li><li>· Systems Integration Management Plan Strategy</li></ul>
<i>Key Parties Involved:</i>	ARCS, CentriQ
<i>Contract Form:</i>	Alfonso Vega Bid Manager
<i>Referee:</i>	Phone 0400 215 783

## 9. MELBOURNE METRO TUNNEL PROJECT

### 9.1 CONTINUUM CONSORTIUM

<b>Project Name:</b>	<b>Continuum - Systems Engineering</b>
<b>Project Location:</b>	Melbourne
<b>Project/Description:</b>	<p>ARCS are engaged by the Continuum Consortia as their specialist systems engineering consultants for project.</p> <p>ARCS provided technical and systems engineering advice and assistance in the development of entire system engineering strategy and documentation including, system requirements, testing, verification and validation, risk assessment, etc.</p> <p>This included the preparation of:</p> <ul style="list-style-type: none"><li>o Systems Engineering and Systems Assurance strategy plan</li><li>o Maintainability Strategy plan</li><li>o Systems Engineering and Systems Assurance Teams and key Personnel</li><li>o Key Documentation including:<ul style="list-style-type: none"><li>» Doors Compliance Matrix</li><li>» Draft Requirements Traceability Matrix</li><li>» Initial Hazard Log</li><li>» Initial Ram Log</li><li>» Draft Goal Structuring Notation</li><li>» System Breakdown Structure</li><li>» Draft VCRM</li></ul></li><li>o Key Analysis<ul style="list-style-type: none"><li>» Preliminary Hazard Analysis Report</li><li>» Early Human Factors Analysis Report</li><li>» Early RAM Analysis Report.</li></ul></li><li>· Configuration Management Plan Strategy</li><li>· Requirements Management Plan Strategy</li><li>· Verification and Validation Management Plan Strategy</li><li>· Systems Integration Management Plan Strategy</li></ul>
<i>Key Parties Involved:</i>	ARCS, Continuum
<i>Contract Form:</i>	Howard Humffray Bid Manager
<i>Referee:</i>	Phone 0407 398 878



## 10. ARTC

### 10.1 TRAIN CONTROL SYSTEM VIRTUALISATION

<b>Project Name:</b>	<b>ARTC - Train Control System Virtualisation</b>
<b>Project Location:</b>	Adelaide
<b>Project/Description:</b>	<p>ARCS were engaged by ARTC as their technical specialist consultants for the design of their train control virtualisation strategy.</p> <p>ARCS provided technical design services and assistance in the development of requirements, Design Options and risk of the various architectures and options for deployment.</p> <p>This included conducting and facilitating risk assessments, the preparation of an operational concept and preliminary design, preparation of detailed design and associated documentation, recommendations on specific functional and various project matters and implementation support and advice.</p>
<i>Key Parties Involved:</i>	ARCS, ARTC
<i>Contract Form:</i>	Tim Ryan General Manager Assets and Operations,
<i>Referee:</i>	Phone 0439 845 322

### 10.2 INLAND RAIL LEVEL CROSSING PROJECT

<b>Project Name:</b>	<b>ARTC – Level Crossing Project</b>
<b>Project Location:</b>	Brisbane
<b>Project/Description:</b>	<p>ARCS were engaged by ARTC for the management of the upgrades of the Inland Rail Project level crossings including development of datasets and the classification of green and brown field upgrades across the 1800km alignment including:</p> <p>Conducted a review of Project Tenders Assessment processes for the awarding the project packages as well as the property legal aspects of the proposed greenfield alignment, and assisting in the review and development of Project related Standard Drawings</p> <p>Developed and managed the Melbourne to Brisbane Inland Rail Level Crossing Datasets to prioritise the required infrastructure upgrades.</p> <p>Identified and implemented existing legislative processes to manage the closure and amalgamation of level crossings along the Rail, which improved both road safety and operational efficiencies with improved section running times and reduced projected construction costs.</p>
<i>Key Parties Involved:</i>	ARCS, ARTC
<i>Contract Form:</i>	Tim Ryan General Manager Assets and Operations,
<i>Referee:</i>	

## 11. ADANI - CARMICHAEL RAIL NETWORK PROJECT -

### 11.1 STAKEHOLDER, LAND & INTERFACE MANAGEMENT

<b>Project Name:</b>	<b>Stakeholder, Land and Interface management</b>
<i>Project Location:</i>	Townsville, Qld
<i>Project/Description:</i>	<p>ARCS provided the Stakeholder Management, Land Management &amp; Interface Management scope for the Carmichael Rail Network and provided high level support and advice to the Project Delivery Team including:</p> <p>Established "face to face" relationships which had previously deteriorated, including bringing back internal and external players back to a professional workable standing, which enabled key work to progress to the successful execution of the agreements.</p> <p>Re-established a fractured and dysfunctional relationship between two significant Local Government Authorities and a significant state Government agency via research and development of stakeholder management practices, implementing best practice and building trust through high level Infrastructure and Interface</p>
<i>Key Parties Involved:</i>	The work is complete
<i>Contract Form:</i>	ARCS, Adani Engineering Design and Project Management
<i>Referee:</i>	Mr Ramesan Nair Project Services Manager, Carmichael Rail Network ramesan.nair@adani.com.au                      0499 386 644

## 12. TASRAIL

### 12.1 TRAIN CONTROL SYSTEM REPLACEMENT

<b>Project Name:</b>	<b>Tasmania Rail – Train Control System Replacement</b>
<i>Project Location:</i>	Launceston Tasmania
<i>Project/Description:</i>	ARCS provided technical and commercial advice to TasRail in the design, preparation of tender and contract documentation and selection of a replacement for the current track warrant based train control system. The new system contemplates a new graphics based train overview system, electronic delivery of the track warrants and the use of a GPS safety overlay. The project also includes the delivery of a new DMR radio system.
	The work includes an EOI, RFT and tender evaluation phase followed by a ongoing role as technical specialist and project superintendent
<i>Key Parties Involved:</i>	The work is complete ARCS, TasRail
<i>Contract Form:</i>	Engineering Design and Project Management
<i>Referee:</i>	David Baker Project Manager Train Control Project, Phone 0457 814 355

### 12.2 TASMANIA RAIL – TRAIN CONTROL SYSTEM TRAINING PROGRAMME

<b>Project Name:</b>	<b>Tasmania Rail – Train Control System Training Programme</b>
<i>Project Location:</i>	Launceston Tasmania
<i>Project/Description:</i>	The nature and magnitude of the introduction of the computer assisted and electronic dispatch system had significant impact on the operation of TasRail's rail network. The impact on safeworking from train control, work gangs, maintenance processes, train drivers and contractor was identified as a significant risk early in the process of the upgrade. ARCS were engaged to oversee the transition and to provide training material and training for the complete organisation. This included the preparation of 22 separates training modules, skills mapping and course arrangements, and tracking of individual training scores. The work was done over a 12 month period and in parallel with the introduction of the new system and was co-ordinated to marry in to the live working of the new system.
	Courses were prepared for: <ul style="list-style-type: none"> <li>• Management</li> <li>• Support staff</li> <li>• Train controllers</li> <li>• Locomotive drivers</li> <li>• Contractors and Maintenance staff and work gangs</li> </ul>
<i>Key Parties Involved:</i>	ARCS, TasRail
<i>Contract Form:</i>	Engineering Design and Project Management
<i>Referee:</i>	David Baker Project Manager Train Control Project, Phone 0457 814 355

## 13. QUEENSLAND RAIL


### 13.1 QUEENSLAND RAIL, LEVEL CROSSING RATIONALISATION PROJECT

• <b>Project Name:</b>	<b>Queensland Rail, Level Crossing Rationalisation Project.</b>
• <b>Project Location:</b>	Brisbane, QLD
• <b>Project/Description</b> :	ARCS consultants were engaged by Queensland Rail to close 124 level crossings within Queensland Rail without a single ministerial compliant. These were achieved over several years and this body of work contributed to the inception and later development of the Australian Level Crossing Assessment Model aka ALCAM.  ARCS assessed over 1,000 crossings under the ALCAM model throughout regional Queensland covering the full cycle, from initial desktop analysis, concept development and scoping, resourcing, negotiation and contract execution of level crossing assessments.  The work is complete.
<i>Key Parties Involved:</i>	Queensland Rail
<i>Contract Form:</i>	Project Manager/Consultancy
<i>Value:</i>	Confidential
<i>Referee:</i>	<ul style="list-style-type: none"> <li>• QR Property Manager – Mr John Wooley,</li> </ul>

### 13.2 QUEENSLAND RAIL, FIVE YEAR STRATEGIC PLAN FOR QR OPERATIONAL SYSTEMS.

• <b>Project Name:</b>	<b>Queensland Rail, Five Year Strategic Plan for QR Operational Systems.</b>
• <b>Project Location:</b>	Brisbane, QLD
• <b>Project/Description</b> n:	ARCS were engaged by Queensland Rail to provide technical advice, strategic planning and management for the development of the Five Year Strategic Plan for QR Operational Systems  The work involves identifying client requirements, client agreement and sign-off, preparation of documentation, management of estimates, evaluation, project management and superintendence.  The work is complete.
<i>Key Parties Involved:</i>	Queensland Rail
<i>Contract Form:</i>	Project Manager/Consultancy
<i>Value:</i>	Confidential
<i>Referee:</i>	<ul style="list-style-type: none"> <li>• QR General Manager Operations Network Access Group QR – Mr Ian Dall, ☎ Phone 07 3235 2871</li> </ul>

### 13.3 QUEENSLAND RAIL, PREPARATION OF THE SPECIFICATION AND ASSOCIATED DOCUMENTATION FOR THE NEW TRAIN CONTROL SYSTEM (RTCOS)

• <b>Project Name:</b>	<b>Queensland Rail, Preparation of the specification and associated documentation for the new Train Control System (RTCOS)</b>
• <b>Project Location:</b>	Brisbane, QLD
• <b>Project/Description:</b>	ARCS were engaged by Queensland Rail to develop the specification and associated documentation for the replacement of their current Train Control System. (RTCOS)
	The work involves identifying client requirements, client agreement and sign-off, preparation of documentation, management of estimates, evaluation, project management and superintendence.
	The work is complete.
<i>Key Parties Involved:</i>	Queensland Rail
<i>Contract Form:</i>	Project Manager/Consultancy
<i>Value:</i>	Confidential
<i>Referee:</i>	<ul style="list-style-type: none"> <li>• QR General Manager Operations Network Access Group QR – Mr Ian Dall,</li> </ul>
	 Phone 07 3235 2871

### 13.4 QUEENSLAND RAIL – SE QUEENSLAND SMARTS PROJECT – INDOOROOPIILLY AND CORINDA RAIL BRIDGE PROTECTION SYSTEMS

• <b>Project Name:</b>	<b>Queensland Rail – SE Queensland SMARTS Project – Indooroopilly and Corinda Rail Bridge Protection Systems</b>
• <b>Project Location:</b>	Brisbane, QLD
• <b>Project/Description:</b>	ARCS designed, developed, deployed and support a number of technology solutions to allow QR to better monitor and manage their rail infrastructure. ARCS has designed, developed, deployed and now maintains two bridge protection systems (BIPS) to detect warn and alert overheight vehicles as they approach low bridges. The BIPS incorporates the use of fan lasers, CCTV, accelerometers and variable message signs. The BIPS detects overheight vehicles and alerts the vehicle via a variable message sign. The advice of any impact together with CCTV footage is sent to QR by email for evaluation to determine if the rail bridge needs to be closed for rail traffic. This system has been an overwhelming success and is now a requirement on all new bridges in the SEQ.
	The BIPS has reduced impacts from a reported 3 per month to 1 per year. The work at these two sites is complete an ARCS is now supporting these systems.
<i>Key Parties Involved:</i>	ARCS, QR
<i>Contract Form:</i>	Engineering Design and Project Management

*Referee:*


- QR – Project Co-ordinator Paul Mitchell.  
📞 07 3235 1183

### 13.5 DEVELOPMENT OF A QR NETWORK'S TELECOMMUNICATIONS ASSET MANAGEMENT PLAN FOR QR NETWORK

<b>Project Name:</b>	<b>Development of a QR Network's Telecommunications Asset Management Plan for QR Network</b>
<b>Project Location:</b>	Perth, WA
<b>Project/Description:</b>	<p>ARCS were engaged by QR Network to provide technical advice, strategic planning and management for the development of the Strategic Asset Plan for QR Network's Telecommunications Backbone Network</p> <p>The work included identifying assets and asset condition, creating the framework and plan structure in accordance with PASS 55, gathering requirements, conduct management briefings and facilitated workshops, prepare of draft plans and documentation, development of maintenance and financial plans for each asset type and project management.</p> <p>ARCS also provided QR with strategic technical advice and planning for the future directions of the telecommunication network. The work is complete.</p>
<b>Key Parties Involved:</b>	QR Network
<b>Contract Form:</b>	Project Manager/Consultancy
<b>Value:</b>	Confidential
<b>Referee:</b>	<ul style="list-style-type: none"><li>• QR Network Manager Signalling and Communications - Mr Barney Schubert, ☎ 07 3235 2020</li></ul>

## 14. AURIZON

### 14.1 BLACKWATER AND DINGO LEVEL CROSSING PROTECTION SYSTEM

• <b>Project Name:</b>	<b>QR National (Aurizon)- Blackwater and Dingo Level Crossing Protection System</b>
• <b>Project Location:</b>	Blackwater, QLD
• <b>Project/Description:</b>	<p>ARCS have developed a revolutionary and innovative detection and monitoring system to detect fast moving (black) whip antennas using high pulse laser assemblies. In this application, ARCS are required to detect overheight vehicles including the whip antenna on the vehicle prior to the vehicle going through an electrified road crossing.</p> <p>The system incorporates the use of fan lasers, CCTV, stationary vehicle detection using video analytics and fan lasers and variable message signs. The system detects overheight aerals on vehicles and alerts the vehicle via a variable message sign. The advice of any overheight detections and stationary vehicles together with CCTV footage is sent to QRN by email for evaluation. To date there have been no incidents where the overheight road trains have been left stranded and fouling the crossing due to the impact of their antenna with the 25KV overhead wire traction system. This results in a stoppage of coal system and in some cases death to the road train driver. The costs due to the delays to trains as a result of these types of incidents are excessive.</p> <p>This work has been commissioned by QRN due to the reputation of problem solving gained by ARCS over the years and is a green field site.</p> <p>This technology has been designed by ARCS and will be implemented and fully tested by the ARCS QLD site team who is currently installing the system.</p>
<i>Key Parties Involved:</i>	Aurizon, Main Roads Local Councils
<i>Contract Form:</i>	Design, testing, implementation, operational development, support and maintenance.
<i>Value:</i>	Confidential
<i>Referee:</i>	 Aaron Hoag 0409 473 879

ARCS have also been involved in many other projects and would be happy to expand on their experience at your convenience



## 15. IPSWICH CITY COUNCIL

### 15.1 ROSEWOOD SHOWGROUNDS LORAWAN IOT INSTALLATION

• <b>Project Name:</b>	<b>Rosewood Showgrounds IoT Installation</b>
• <b>Project Location:</b>	Qld
• <b>Project/Description:</b>	<p>ARCS have recently been deployed an IoT SMART City pilot site at Rosewood Showgrounds as part of the Ipswich City Council Smart City Program Pilot project. The design includes:</p> <ul style="list-style-type: none"><li>• Smart Lighting</li><li>• CCTV cameras with video analytics</li><li>• Power monitoring</li><li>• Caravan park power switching and monitoring</li><li>• Solar Power including power monitoring</li><li>• Rainwater Tank Monitoring</li><li>• SmartBins Rubbish Bin Monitoring</li><li>• Toilet Access Monitoring</li><li>• Weather Monitoring</li></ul>
<i>Key Parties Involved:</i>	ARCS, Ipswich City Council
<i>Contract Form:</i>	Samantha Smith   Coordinator (Smart City Projects) Works, Parks and Recreation Department
<i>Referee:</i>	Phone 07 3810 6666

## 16. CHERBRUG COUNCIL

### 16.1 CHERBOURG IOT (LIGHTING AND CCTV)

• <b>Project Name:</b>	<b>Cherbourg IoT (Lighting and CCTV)</b>
• <b>Project Location:</b>	Qld
• <b>Project/Description:</b>	<p>The Cherbourg project was designed, installed and commissioned by ARCS.</p> <p>It includes Smart lighting and CCTV Cameras with video analytics.</p> <p>The Smart lighting included control and monitoring and is managed via a proprietary GUI designed for the job.</p> <p>The GUI together with the CCTV viewer includes both remote access (ARCS Office) and local (remote) control from the local police station.</p> <p>This system uses the ARCS MeshNET Smart Lighting system and the ARCS MeshNET system to communicate between the 7 local nodes.</p>
<i>Key Parties Involved:</i>	ARCS, Cherbourg, Telstra
<i>Contract Form:</i>	Warren Collins CEO
<i>Referee:</i>	Phone 07-4168 1866


## 17. TAMWORTH REGIONAL COUNCIL

### 17.1 TAMWORTH KABLE PLAYGROUND IOT


• <b>Project Name:</b>	<b>Tamworth Kable Playground IoT</b>
• <b>Project Location:</b>	NSW
• <b>Project/Description:</b>	<p>The Tamworth Kable Ave Playground was designed as a proof of concept. The design includes:</p> <ul style="list-style-type: none"><li>• Smart Lighting</li><li>• SmartBins Rubbish Bin Monitoring</li><li>• Parking</li><li>• Emergency call points</li></ul> <p>This system uses the ARCS MeshNET to communicate between the nodes. The controllers are fitted with PIR beams to activate the lighting due to the presence of people walking. The GUI was a proprietary GUI design for these works.</p>
<i>Key Parties Involved:</i>	ARCS, Tamworth Regional Council, Telstra
<i>Contract Form:</i>	Grant Reeckmann Projects and Assets Officer Tamworth Regional Council
<i>Referee:</i>	Phone 02 6767 5031

## 18. MAIN ROADS OF WA

### 18.1 MRWA – MRWA/PTA NORTHERN FREEWAY CCTV MONITORING


<ul style="list-style-type: none"> <li>• <b>Project Name:</b></li> <li>• <b>Project Location:</b></li> <li>• <b>Project/Description:</b></li> </ul>	<p><b>Main Roads WA – MRWA/PTA Northern Freeway CCTV Monitoring</b></p> <p>Perth, WA</p> <p>ARCS MRWA/PTA rollout of a combined corridor CCTV monitoring capability for the Northern Railway / Freeway. This involving the installation and integration of approximately 100 cameras. The work extends from the Graham Farmer Freeway Rail underpass to Butler.</p> <p>This project is a joint initiative of the WA Main Roads and PTA and is part of a rail safety initiative to detect intrusions into the rail reserve.</p> <p>The work involves market review, design, documentation and management of the final contract.</p> <p>The work has just commenced and contemplates IP based cameras</p>
<p><i>Key Parties Involved:</i></p> <p><i>Contract Form:</i></p> <p><i>Value:</i></p> <p><i>Referee:</i></p>	<p>PTA, MRWA</p> <p>Project Engineering and Management Consultancy</p> <p>The total value of the project is currently being determined</p> <p>PTA Project Implementation Manager - Mr Scott La Vertu,   089326 2506</p>

### 18.2 MAIN ROADS WA – ADAPTIVE LIGHTING IOT INSTALLATION NORTHERN FREEWAY

<ul style="list-style-type: none"> <li>• <b>Project Name:</b></li> <li>• <b>Project Location:</b></li> <li>• <b>Project/Description:</b></li> </ul>	<p><b>Main Roads WA – Adaptive Lighting IoT Installation Northern Freeway</b></p> <p>Perth, WA</p> <p>ARCS installed the MeshNET technology in each light including motion sensors to detect passing foot and bicycle traffic and a gateway to collect usage data and pass to an office server, to provide authorised users to monitor and control the lights.</p> <p>The lights are controlled completely automatically; with the lights being turned on in the evening and off in the morning by a photo electric cell. If no movement is detected on the PSP for a configurable time, the lights will dim to a set level. As soon as movement is detected, the lights will brighten to a pre-determined level for the configurable time and then dim again.</p>
<p><i>Key Parties Involved:</i></p> <p><i>Contract Form:</i></p> <p><i>Value:</i></p> <p><i>Referee:</i></p>	<p>MRWA</p> <p>Project Engineering, Design and Implementation</p> <p>The total value of the project is currently being determined</p> <p>MRWA Project Manager - Chris Raykos,   0419 905 569</p>

## 19. TRANSPORT INFRASTRUCTURE DEVELOPMENT CORPORATION

### 19.1 TRANSPORT INFRASTRUCTURE DEVELOPMENT CORPORATION TECHNICAL ADVICE

<b>Project Name:</b>	<b>Transport Infrastructure Development Corporation Technical Advice</b>
<b>Project Location:</b>	Sydney, NSW
<b>Project/Description:</b>	<p>ARCS provided technical advice for the CIMS including Train Control Systems, passenger information etc works for TIDC being installed and commissioned in the Sydney. The project also includes the provision of Train Control, Customer Information Systems and associated field works.</p> <p>The work included identifying assets and asset condition, gathering requirements, conduct management briefings and facilitated workshops and preparing draft plans and documentation.</p> <p>The work is complete.</p>
<i>Key Parties Involved:</i>	TIDC, RailCorp
<i>Contract Form:</i>	Project Consultancy
<i>Value:</i>	Confidential
<i>Referee:</i>	<ul style="list-style-type: none"><li>• TIDC System Manager Mr Darin O'Brien,</li></ul>  0417 330 560

## 20. BHPB

### 20.1 BHPB RAIL TECHNOLOGY SYSTEM CONTRACT

<ul style="list-style-type: none"><li>• <b>Project Name:</b></li><li>• <b>Project Location:</b></li><li>• <b>Project/Description:</b></li></ul>	<b>BHPB Rail Technology System Contract</b> Perth, WA ARCS were involved in the complete project development, requirements analysis, and preparation of specifications and provision of technical advice for the Rail Technology System for BHPB. The RTS will replace the existing train control, SCADA, train planning and scheduling systems installed at BHPB Port Hedland operations.  BHPB are currently evaluating tenders and expect to be awarding contract in Dec 2004  The work is complete.
<i>Key Parties Involved:</i>	BHPB
<i>Contract Form:</i>	Technical Advice, Project Management, Superintendency/Consultancy
<i>Value:</i>	Confidential
<i>Referee:</i>	BHPB RTS Project Manager - Mr John Lamberti, ☎ 0439 978 084

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