



Capability Statement

Light rail Consultant Pty Ltd

COMPANY	2
MANAGEMENT PHILOSOPHY	3
SERVICES	6
LRC TEAM	7
IN HOUSE SYSTEMS	14
GLANCE OF RECENT PROJECTS	15
KEY CLIENTS & ALLIANCES	16

Light Rail Consultants (LRC) Pty Ltd is a privately-owned company that provides innovative engineering design and management services to all sectors of the Australian and New Zealand rail and light rail industries.

HISTORY

LRC was established in 2008 to capitalise on specialised expertise in the design of Overhead Line Equipment (OLE) and in Track for both railway and tramway projects.

PURPOSE

The mission of LRC is to be the leader in the market that we serve, to the benefit of our clients and their customers, the local transport authorities and the community who rely on their services.

LRC's objective is to consistently meet client demands and expectations for world class solutions, with high quality designs delivered at competitive rates and to schedule.

Our strategy, through recruitment and training is to provide professionals with proven experience in overhead wiring, track and civil design.



VALUE

Our value to clients is based on our specialist knowledge in overhead wiring systems and rail designs, and our ability to channel this knowledge into comprehensive tailored solutions for the client's specific requirements.

At LRC, we consistently stay in the forefront of design by closely studying industry trends and the latest innovations and techniques, so we can provide each client with the most up-to-date best-practice advice.

In order to meet all our obligations to our clients, we stay familiar with all relevant legislation, authorised engineering policies and publications and with all applicable Australian and international standards.



PEOPLE

Our management philosophy is to:

- Position our team for success by focusing on individual team members and their skills.
- Treat people with respect and transparency by clearly communicating team goals and management expectations.
- Judge the work by the quality of the outcome, not just the amount of effort.
- Maintain team morale and motivation through positive reinforcement; and
- Structure the team and management to provide consistent mutual assistance and support.

LRC employs experienced design experts in civil, structural, and electrical disciplines and engages with its partners to provide further expertise to complement other areas, ensuring LRC is well placed to manage complex engineering design projects.



CLIENT

We work closely with our clients to fully understand the engineering scope, schedule, and budget.

As a result, we provide high quality engineering design solutions, with minimal cost variations and schedule disruptions, traditionally required to cover rework after misunderstood design requirements.

As an integral part of our philosophy, we view stakeholders as co-developers, ensuring that we maintain their design intent and that they stay up to date with design developments.

Our approach to engineering is focused on achieving:

- Quality engineering project deliverables - on time and budget
- Practical designs to meet agreed project objectives.
- Zero rework

Clients benefit from cost saving and practical, workable designs. LRC benefits from building long-term client relationships.



RISK MANAGEMENT

All aspects of health and safety, quality and environmental standards are assessed according to LRC's risk management approach, based on based on AS/NZS ISO 31000:2009 practices and guidelines.

LRC's risk management approach allows us to develop comprehensive controls and treatment strategies, with emphasis on accountability and continuous improvement in risk management.

Every aspect of decision-making includes consideration of risk management, and risk management is an important item at monthly and project review meetings.



BUSINESS

To achieve viable business benefit, LRC always strives to act with integrity to maintain high standards of business ethics and conduct. This principle is applied in our dealings with employees, partners, contractors, clients, suppliers, authorities, governments, competitors, and the community.

Our policies and procedures are consistent with this principle and are part of our framework to guide business operation.



COMPLIANCE

Monitoring compliance is a key element of our business systems, aligned to AS 3806-2006, including: legislative requirements, industry codes, risk management, governance, project audits, and we maintain a strong culture of promoting awareness while maintaining transparency and honest reporting.





HEALTH AND SAFETY

LRC has a commitment in all its actions and undertakings to ensure the occupational health and safety of its staff, contractors and clients, and the safety and wellbeing of the public, through adherence to the Victorian Occupational Health and Safety Compliance Framework, in line with the standard AS/NZS 4801:2001



QUALITY

Quality is managed at LRC through constant supervision, assessment and revision of all internal and external project processes and practices. Our current Quality Management System (QMS) is aligned to the Australian Business Excellence Framework, consistent with the standard AS/NZS ISO 9001:2008, and implementation to achieve full accreditation is underway. Quality in all LRC designs ensures reliability, performance, ease of installation and maintenance.



ENVIRONMENT

At LRC, in our business and with our designs, we understand the importance of our role in ensuring that environmental issues are addressed in all our projects.

This begins with understanding the environmental laws, regulations and standards, ensuring all LRC members are fully informed and accountable and that all reasonable steps are taken, in accordance with AS/NZS ISO 14001:2004, to achieve zero environmental impacts. Our designs focus on longevity, low visual impact and the use of environmentally friendly materials.

LRC SERVICES

**Overhead Wiring Design**

We provide a comprehensive engineering design service, comprising all elements of overhead wiring systems. By making use of the latest design techniques, we deliver modern and innovative designs that are lighter and reduce visual impact.

- System design consulting
- 600V to 1500V AC/DC expertise
- Catenary design
- Power feeder and connection details
- Interlocking solutions and platform design
- Pole, mast and wall bracket design
- Overhead suspension and fitting solutions

**Construction services**

We provide skilled individuals for engineering and project support, supervision and management, so we can ensure planned, essential outcomes.

- Design and supply of steel poles
- Consultation on purchasing Overhead Line Equipment
- Installation supervision
- Project management

**Tramway Signalling**

LRC offer this service with our European partner, Mathrail, to provide a complete solution for the tramway.

We assess the system in advance by driving trams directly in 3D design.

- Signalling modelling
- Signalling simulations
- Project management

**Track & Civil Design**

We undertake engineering designs for new installations and for upgrading operating facilities.

- System and concept design
- Horizontal and vertical design alignments
- Advanced 3D modelling
- Rail fabrication details
- Swept path analysis
- Railway pedestrian crossing
- Track drainage
- Structural design of stations, tram stops, depots and yards

**Ancillary Services**

We offer specialised engineering services, providing breadth of support to important aspects of project development and execution.

- Infrastructural & interface management
- Structural design
- Traffic Design
- Traffic engineering

**Energy Modelling**

We provide engineering services cover every aspect of energy network design, ensuring optimal performance and safety for transit systems. We provide clear information on energy efficiency for each simulated scenario.

- Energy Modelling
- Energy Simulations
- Project management

LRC TEAM

**SENIOR OVERHEAD DESIGN ENGINEER****Kevin Karamad**

Kevin is a civil engineer specialising in tram and train Overhead tractions systems, structural and civil design. Kevin has over 27 years' experience in civil and structural design, his expertise encompasses the complete design for Overhead infrastructure in both light and heavy rail projects and has been involved in the successful delivery of many tram & train projects across Melbourne, Adelaide, NSW and Wellington (NZ). He has recently led OHW designers for the delivery of Brunswick Tram Depot Upgrade, including interlocking, switching & feeder arrangements, and experience in retractable OHW for the depot. Kevin was involved in designing 9 tram depots in Melbourne. Kevin also possesses an excellent understanding of tram track design.

Qualifications

- Bachelor of Engineering (Civil)

Discipline

- Overhead wiring
- Feeder & switching
- Civil/Structural

Accreditation

- Fellow Member of Engineers, Australia
- CPEng, NER, APEC Engineer IntPE(Aus)
- Member of the Railway Technical Society of Australasia
- MTM Competency – Overhead Wire & 22kv Transmission - Designer, Checker & Approver Roles
- Level of Yarra Trams Competency (LOC): A

**SENIOR TRACK DESIGN ENGINEER****Russell Conabere**

Russell has over 40 years' experience as a Track designer in light and heavy infrastructure works and is responsible for the design of some of the most complex track configurations in the Melbourne tram network.

He has also designed complex heavy rail alignments, both in Melbourne and interstate.

As a Senior Track Designer, Russell specialises in both light and heavy rail alignment, with horizontal and vertical design and advanced 3D modelling.

Russell has also gained experience working with the Dublin Light Rail Project and with a mining railway project in Chile. Russell has worked with LRC as a contractor for over 14 years.

Qualifications

- Associate Diploma Civil Engineering
- Numerous Computer Aided Design and Drafting short courses.

Discipline

- Track design

**SENIOR TRACK & CIVIL DESIGN ENGINEER****Tai Nguyen**

Tai has 37 years' experience in Australia railway industry as a design engineer. He has a breadth of experience especially relevant to the railway Track design, Track layouts and geometry, Points and Crossings, Track work components, Level & Pedestrian Crossings Design, Overhead Wiring & Structures, Building Services projects. Provide designs, drawings, estimates, specifications, technical standards, logistical and procedural direction, authoritative technical advice and recommendations on all aspects of Train/Tram Track.

Tai has been involved in the successful delivery of many tram & train projects, Yarra Trams Track Renewals & Upgrade yearly programme (2001-current), Victoria Level Crossing Removal Project - South Eastern Program Alliance (2019-2024), 3D models design for Railway-Tramway crossings at Glenhuntly, Kooyong and Riversdale, Boston – Chestnut Hill Ave, Commonwealth Avenue, Special Works for Light Rail.

Qualifications

- Bachelor of Engineering (Mechanical)
- Power user and macros development for MicroStation

Discipline

- Track layouts and geometry
- DDA Compliant tram platforms, kerb access, easy access stops.
- Station and depot layouts
- Formation, foundations, drainage
- Points and Crossings
- Track work components
- Level & Pedestrian Crossings Design
- Active advance warning signage

Accreditation

- Member Institution of Engineers, Australia
- Chartered Professional Engineer, Mechanical Engineering, CPEng
- National Engineer Register, NER
- APEC Engineer IntPE(Aus)
- RIW: 20-00078281
- VIC Reg. PE0005891
- MTM, V/Line, Yarra Trams competency for Track & Civil, designer and checker roles

**SENIOR OVERHEAD WIRING ENGINEER****Bert Qin**

Bert is a qualified Electrical Engineer who has more than 13 years' practical working experience in Australia and overseas, including Chinese Metropolitan Train System.

Bert is currently leading Western Portal OHLE design of the Rail Infrastructure Alliance RIA project, with the work package forming part of the Metro Tunnel Project (MTP). He has worked on Yarra Trams Feeder & sectionalising diagram and Heavy Rail projects and has recently been involved in the Melbourne Tunnel Project.

Bert has MTM designer and checker ticket with MTM.

Qualifications

- Postgraduate Diploma in Electrical Engineering, Monash University
- Bachelor of Electrical Engineering, Southwest Jiaotong University
- Graduate diploma in Information Technology, Monash University

Discipline

- Overhead Wiring
- Feeder & Switching

Accreditation

- Tram O/H and Track Appreciation, Yarra Trams
- Occupation Health and Safety Induction, White card
- MTM Competency – Over Head Wire - Designer and Checker Role.
- Level of Yarra Trams Competency (LOC): B

**CIVIL ENGINEER & PROJECT MANAGER****David Donaldson**

David is a qualified Civil Engineer who has almost 10 years' practical working experience in light & heavy rail industry. He has worked on numerous Yarra Trams overhead, feeder, and track projects, in design and project management roles. David has excellent skills in project management, client liaison, estimation, and drafting & design for multiple disciplines. The roles he is responsible for at LRC are Project Management & client liaison, management of staff, design and drafting for multiple disciplines, as well as facilitation of workshops, design reports & proposal writing. He also has excellent skills in MS Office and drafting (MicroStation).

Qualifications

- Bachelor of Engineering (Civil and Infrastructure) (Honours), RMIT University.
- Advanced Diploma of Engineering Design, RMIT University
- Occupation Health and Safety Induction, White card

Discipline

- Feeder
- Civil
- Project Management

Accreditation

- MIEAust NER
- Tram O/H and Track Appreciation, Yarra Trams

**SENIOR OVERHEAD WIRING ENGINEER****Shervin Hosseini**

Shervin is a qualified Engineer who has almost 10 years design and drafting experience in heavy rail and light rail infrastructure projects in Melbourne. His involvement includes overhead wiring design, feeder & switching design. Shervin has a strong understanding of OHW principal, specifications, standards and up to date knowledge of DMS requirements.

Qualifications

- Bachelor of Engineering (Civil and Infrastructure) (Honours), RMIT University.
- Diploma of Engineering Drafting, Melbourne Polytechnic.

Discipline

- Overhead

Accreditation

- Member of Engineers Australia – MIEAust NER
- Metro Trains (MTM) - Track Safety Awareness – Level 1
- Metro Trains (MTM) – Competent as a 1500V Overhead Wiring Designer

**CIVIL ENGINEER****Niruethan Sundarasivam**

Niruethan is a qualified Civil Engineer who has been involved in design and drafting of Track, Feeder, and Overhead works. At LRC, he is responsible for managing the track design process through the concept, preliminary to IFC, and submitting as-built drawings into the DMS. Involved in the review process of infrastructure drawings along with assisting in that process. Work closely with other disciplines on multidisciplinary projects as part of a team. (Overhead, Feeder, Traffic Signal) He has excellent skills in MS Office, Excel, and drafting (MicroStation).

Qualifications

- Bachelor of Engineering – Civil (Honours.) Swinburne University of Technology.
- Diploma of Engineering, Swinburne University.
- Diploma of Building & Construction, Oceania Polytechnic Institute of Education.

Discipline

- Track and civil engineer

Accreditation

- Yarra Trams – Overhead and Track Appreciation
- Occupation Health and Safety Induction, White card.
- Member of Engineer Australia.
- Member of Railway Technical Society of Australia
- Track Infrastructure – Monash Institute of Railway Technology (IRT)

**SENIOR PROJECT MANAGER****Peter Lim**

Peter's career has spanned over a number of various engineering environment including Yarra Trams, VicRoads, Vic Road Integration team embedded in North East Link Project, VicTrack and more recently MRPV.

Significant achievements include my 4 years term with VicRoads where I have been part of the alliance team delivering the construction of the Level Crossing Removal Project at Bayswater. This is a complex project which includes a rail interface with MTM for rail infrastructure work, civil infrastructure works, street lighting works and the delivery of a Council funded project for the undergrounding of the overhead high voltage and low voltage cables on Mountain Highway. The work itself presented a number of challenging issues with different stakeholders (MTM, AusNet services, Councils and VicRoads). Peter was also the VicRoads representative embedded in the North East Project acting as an interface to assist in getting the outline scope requirement for the NELP approved by VicRoads CEO.

Qualifications

- Bachelor of Engineering (Civil)
- Diploma in Project Management
- Traffic Management

Discipline

- Project management

Accreditation

- MIE Aust CPEng, NER, APEC Engineer IntPE(Aus)
- Construction OH & S NSW
- Construction OH & S Induction, Victoria

LRS

LRS (LRC Registration System) is an in-house developed, project system that supports office management. Its main purpose is to allow the company to run more smoothly.

LRS helps control project work including documents, schedules, resources, contacts, timesheets, time costs, expenses, invoice billing, contracts, reports and transmittals. The system provides better visibility and control of projects in a real-time, day-to-day environment, improving work scheduling, productivity, timesheets and ensuring deadlines are met.

LRC-Developed Computer Software Design Tools

LRC has developed design tools based on MS Excel and MS Visual Basic, to reduce computation and checking time. The design tools produce calculations for overhead line geometry, with result-checking, for wiring tensioning and swing parameters, curve loading and support spacing, stagger and pendulum height, across temperature differentials. Elements of the LRC Design Tools are shown below.

The Auto-tension Swing program calculates stagger change and wire creepage for given lengths of auto-tensioned overhead wiring on cantilever supports, within a temperature differential.

The Curve Spacing program calculation ensures that trolley wire stagger is within the specified limits throughout the prescribed curve radius, with consideration of mid-span offset, to produce acceptable support span spacing and segment loading.

Auto-tension Swing

Initial Temp(°C)=	0
Final Temp(°C)=	50
Distance from MPA(m)=	500
Cantilever pivot length(mm)=	3000
Stagger Change(mm)=	50
Change in wire length(mm)=	425

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Curve Spacing

Curve Radius (m):	23
Outside Stagger (m)	0.23
Inside Stagger (m)	0.15
Curve Spacing (m)	8.4

Load is high, reduce the spacing to

7.9

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Pendulum Suspension Temperature Sag and Offset

The Pendulum Suspension program, shown below, checks the stagger and height of pendulum against the cross-section temperature suspension height and stagger tables.



These software programs, amongst others including Contact Wire Wear and Centre/End Throw calculations, are available to our design team members either in-house or online via the LRC web site.

Rail Infrastructure Design Software Suite

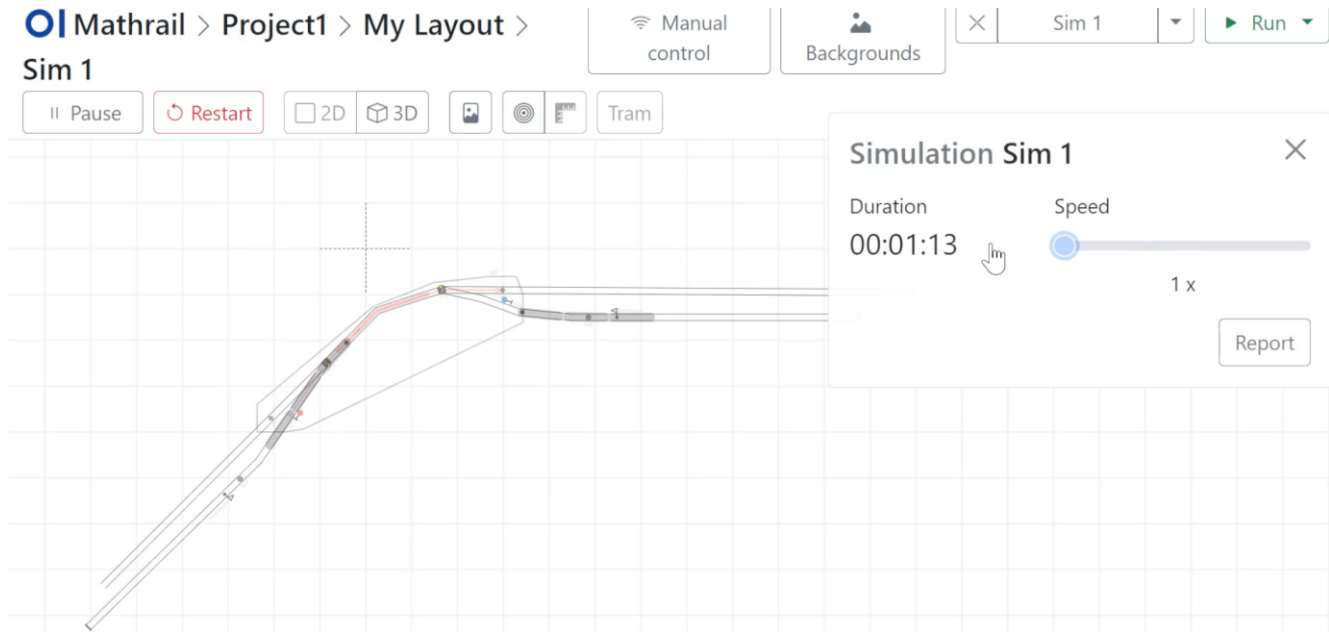
The proprietary design software suite employed by LRC includes state-of-the-art features, including, amongst others:

- Generates preliminary 2D plans and realistic 3D models for concept analysis and visualisation against prerequisite parameters, alternative layouts and design options
- Accommodates hybrid systems that involves merging of old and new technologies
- Includes a user configurable and updatable suite of integrated design rules and checks, to optimise the design and guide and alert designers when tolerances are reached and exceeded
- Provides full connectivity that allows project engineers to apply their skill and judgement to refine and optimise designs prior to construction, or to capture as-built changes after construction
- Has parametric templates containing variations and dependencies, supports changes in track geometry and spacing, curvature, cant, wire height and stagger, which simplifies and automates the design process, providing consistency, productivity improvements and cost savings
- Can facilitate templates to provide an evolving OLE library for client, project or corporate future use as standards or for rework in other projects
- Produces fully annotated project drawings and deliverables including design check sheets, reports and schedules: asset lists, cost estimates, delivery schedules, construction pick lists and site set out
- Incorporates restricted 'fixed zones' and clearances to avoid obstacles such as over-track distributions, tunnels, crossings, bridges, structures and underground utilities
- Maintains complete information for use, not only with the current project, but for future use in operations, maintenance and rehabilitation works to sustain the network
- Caters for to a range of configurable international standards for global infrastructure projects
- Addresses both horizontal and vertical track geometry, and also station, yard and depot layouts, as well as earthworks and track ballast

Mathrail signalling

Mathrail > Project1 > My Layout >
Manual control
Backgrounds
Sim 1
Run

Sim 1
Pause
Restart
2D
3D
Tram

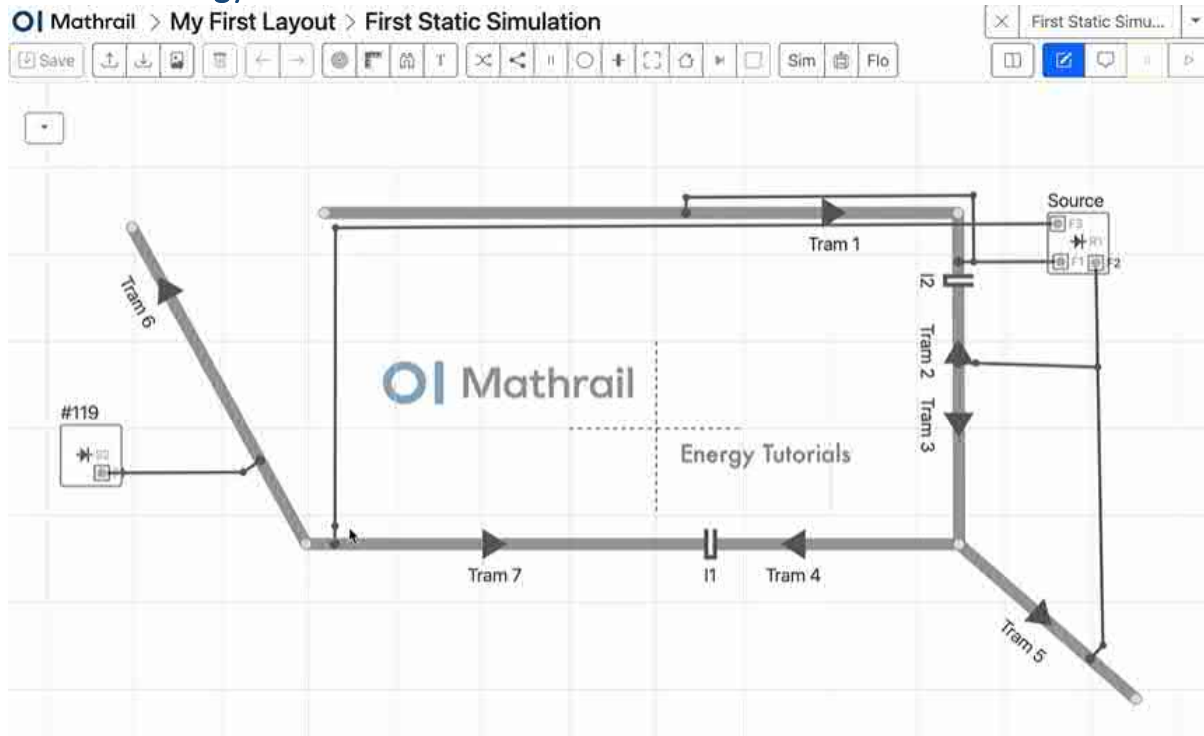


For more precise results, Mathrail offers a capacity simulation designed for testing your tramway network in different situations and providing sophisticated reports for comparing the simulation results.

Mathrail energy

Mathrail > My First Layout > First Static Simulation
First Static Simu...

Save
Print
Undo
Redo
Home
Zoom In
Zoom Out
Reset
Sim
Flo



This tool is powerful enough to help to understand in extensive detail the reason why particular situations are occurring on the existing route.

VICTORIA

Yarra Trams

- Renewal works for Track
 - o Melville Rd
 - o Swanston & Victoria St
 - o Swanston & La Trobe Intersection
 - o La Trobe & Spencer St Intersection
 - o Collins & Spencer St Intersection
 - o Maribyrnong Rd
 - o St Kilda Rd
 - o Swanston St (Melbourne Uni)
 - o Swanston St (Queensberry Crossover)
 - o Mt Alexander Rd
 - o Preston Workshop – Eastern & Western Fans
 - o Malvern Rd
 - o High St, Kew
 - o Glenferrie Rd –including High St & Malvern Rd intersections
 - o Swan St
- Renewal works for Feeder
 - o Melville Rd
 - o Glenferrie Rd
 - o Mt Alexander Rd
 - o Swan St
- Yarra Trams Power Department Works
 - o Route 58 Works – various locations along route 58

Yarra Trams (Major Projects)

- Brunswick Depot upgrade
- Melville Road
- Simpson Street Siding – Feeder Design
- William & Collins Feeder

Ballarat Tram Meusem

- Track Design/ Independent review of track design for renewal of sections of Ballarat Network

SOUTH AUSTRALIA

- Government of South Australia – Department of Planning, Transport and Infrastructure
 - o Glengowrie Tram Depot – Overhead Design
 - o Adelaide North Terrace Pole Relocation – Overhead Design
- Australian Electric Transport Museum (S.A.)
 - o Overhead design at Mangrove St

- Renewal works for Overhead
 - o Melville Rd
 - o Swanston & Victoria St
 - o La Trobe & Spencer St Intersection
 - o Collins & Spencer St Intersection
 - o Maribyrnong Rd – Crossover relocation
 - o St Kilda Rd & Carlise St Intersection & Weight Tension
 - o Swanston St (Melbourne Uni)
 - o Swanston St (Queensberry Crossover)
 - o Mt Alexander Rd
 - o St Georges Rd Weight Tension
 - o Plenty Rd Weight Tension
 - o Preston Workshop – Eastern & Western Fans
 - o Glenferrie Rd High St & Malvern Rd intersections
- Yarra Trams Agency Works
 - o Various Pole Relocation works
 - o Various Aerial Feeder Relocation works

MTM – Heavy Rail

- Melbourne Tunnel Project – Rail Network Alliance
- Maribyrnong River Bridge
- Greensborough & Montmorency track duplication
- Level crossing removal:
 - o Dublin Road
 - o Caulfield to Dandenong
 - o Furlong Main Blackburn Heatherdale

Bendigo Tram Museum

- Overhead Design for dual operation for multiple curves in the Bendigo network
- Track design for rail bending for a removal option for curves into a depot road.

QUEENSLAND

- Preparation of rail bending (Gold Coast)

**Yarra Trams**

Yarra Trams is the trading name of the Melbourne tram network, which is owned by the Victorian State Government. The current franchise is operated by the KDR Melbourne consortium, owned by Keolis and Downer Rail. As at May 2014, Yarra Trams operate 487 trams, across 26 tram routes, over 1,763 tram stops. With 250 km (155.3 miles) of double track. Melbourne's tram network is the largest in the world.

**Vic Roads**

VicRoads or the Roads Corporation of Victoria is a statutory corporation which is the road and traffic authority in the state of Victoria, Australia. It is responsible for maintenance and construction of the arterial road network, as well as driver licensing and vehicle registration

**Vic Track**

VicTrack owns Victoria's transport land, assets and infrastructure – and works to protect and grow the value of the portfolio to support a thriving transport system and make travel and living better for Victorians.

**Pitt & Sherry**

Pitt and Sherry is a leading Australian engineering and multi-specialist infrastructure consultancy servicing the transport, industrial, mining, energy, food and beverage and community sectors. Pitt & Sherry provide their expertise to LRC in bridge and other structural design.

**AECOM**

AECOM is an international leader, providing integrated professional technical and management support services for: transportation, energy, water systems, architecture, engineering, construction, mining, environment, economics and government market sectors.

**Aurecon**

Aurecon is an engineering, design and advisory company, based in Australia and South Africa. The company delivers project design and management across twelve markets. They are built environment, construction, data and telecommunications, defence, energy, government, international development assistance, manufacturing, resources, transport and water.

**SMC Holdings**

SMC Holdings Limited is an Australian based-firm that provides consulting services on major infrastructure projects around the world. SMC undertakes feasibility studies, design, tender and contract management, construction supervision and project management.

**GHD**

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. GHD is also a contractor client of LRC.

**Jacobs**

Jacobs Engineering Group Inc. is an American international technical professional services firm. The company provides technical, professional and construction services, as well as scientific and specialty consulting for a broad range of clients globally including companies, organizations, and government agencies

**Activate Rail**

Activate is a Design and Construction Joint Venture between Coleman Rail (40%), John Holland Rail (30%) and John Holland Civil (30%). The joint venture, formed in 2012, completed works for the Regional Rail Link project, main track and engineering between Southern Cross Station and Moonee Ponds Creek.

**McConnell Dowell**

Formed in 1961, McConnell Dowell is a major Australian engineering, construction, building and maintenance contractor, delivering engineering excellence in three key industry sectors of building, infrastructure and resources.

**Traffic Group Australia**

Traffic Group Australia specialises in the provision of traffic management services to local authorities, road maintenance providers, large utility/infrastructure companies and civil engineering contractors throughout Australia.

**Traffix Group**

Traffix Group is an industry leader in transport planning, transport engineering and transport related infrastructure and construction works.

We provide a full suite of traffic and transport services.



Light Rail Consultants Pty. Ltd.

ABN: 74 133 886 245

Suite 201

20-22 McKillop Street Melbourne VIC 3000

Tel: +61 3 9642 0101

Email: info@light-rail.com.au

www.light-rail.com.au