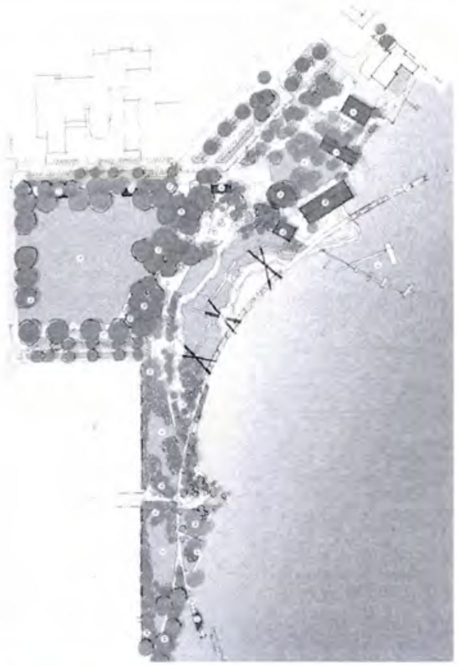
Electrical Title Sheet

Rotorua Lakefront

Rotorua CBD



Electrical Layout Drawings

Tender
Not for Construction

Sheet List Electrical Stage 1 & 1 A

Sheet Number	Sheet Name	Current Revision
E00	Electrical Title Sheet	
E01	Lakefront Overview	
E10	Stage 1 & 1A Lighting Renders	
E11	Stage 1 & 1A Luminaire Schedules	1
E12	Stage 1 & 1A Electrical Schematics	1
E13	Stage 1 Overview	
E14	Stage 1 Electrical 1 of 3	1
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E16	Stage 1 Electrical 3 of 3	1
E17	Stage 1A Overview	
E18	Stage 1A Electrical 1 of 2	1
E19	Stage 1A Electrical 2 of 2	1
E20	Stage 1 & 1A Future Stages Overview	
E21	Stage 1 & 1A Electrical Future Stages 1 of 3	1
E22	Stage 1 & 1A Electrical Future Stages 2 of 3	
E23	Stage 1 & 1A Electrical Future Stages 3 of 3	1

General Note
Drawings are for information purposes only. Do not scale off drawing.

Rev	Description	Date

Purpose of Issue: Tender

Consultant: SEG

Project: Rotorua Lakefront

Title: Electrical Title Sheet

Client: Rotorua Lakes Council

Drawn by: BW | Reviewed: RS | Date: 18.04.2019

Project number: S18-037

Drawing number: S18-037- E00 | Rev:

24/04/2019 5:15:42 PM

DOCUMENT TRANSMITTAL

SEG SERVICE ENGINEERING GROUP

PROJECT: Rotorua Lakefront
LOCATION: Rotorua CBD
JOB NO: S18-037

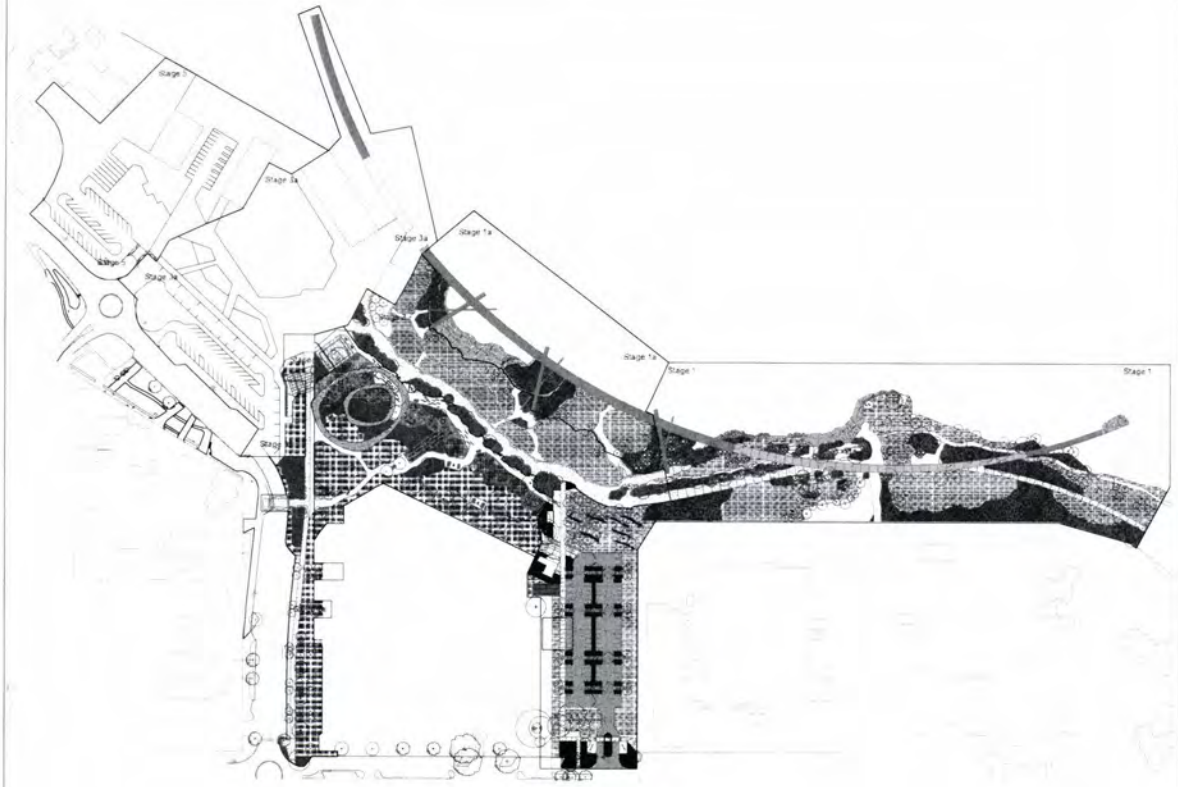
WE ENCLOSE COPIES OF THE LISTED DOCUMENTS				
	DAY	21	18	23
	MONTH	02	04	04
	YEAR	19	19	19

A - APPROVAL	B - CONSENT	C - CONSTRUCTION	I - INFORMATION
P - PRELIMINARY	T - TENDER	R - REVISION	V - VERIFICATION

STATUS		
T	I	T

DRAWING/ DOCUMENT TITLE:	DRAWING NO	LATEST REV.	REVISION		
Rotorua Lakefront Stage 1 & 1 A Lighting Calculation Drawings for Detailed Design	S18-037-L	-	-		
Rotorua Lakefront Stage 1 & 1A Electrical Layout Drawings for Tender	**S18-037-E**	**1**	-		1
Rotorua Lakefront Stage 1 & 1A Electrical Specification for Tender	**S18-037-ES**	**1**	-		1
Rotorua Lakefront Stage 2 & 3 Lighting Calculation Drawings	S18-037-L	I		I	

APPROVED:



General Note
Drawing sent for information purposes only. Do not scale off drawing.

Rev	Description	Date

Tender

SEG

Rotorua Lakefront

Lakefront Overview

Rotorua Lakes Council

Drawn By	Reviewed By	Date
RW	RS	18.04.2019

Scale @ A1	Project Number
1: 1000	518-037

Drawing Number: 518-037- E01 Rev:

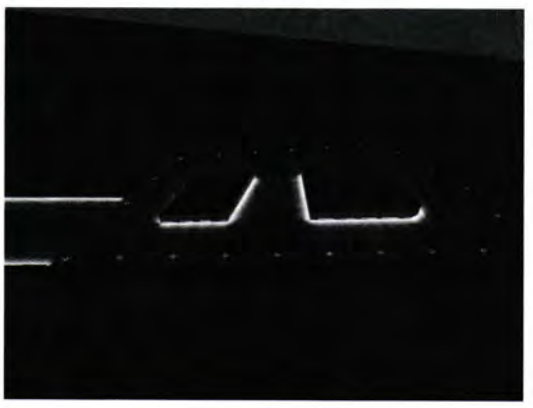
24/04/2019 5:16:45 PM

Waiwera Lighting Render

Boardwalk and Tutunuiu Bridge Render

Tutunuiu Bridge Render

Pontoon Lighting Render



General Note
Drawing sent for information purposes only. Do not scale off drawing.

Rev	Description	Date

Tender

SEG

Rotorua Lakefront

Stage 1 & 1A Lighting Renders

Rotorua Lakes Council

Drawn By	Reviewed By	Date
RW	RS	18.04.2019

Scale @ A1	Project Number
	518-037

Drawing Number: 518-037- E10 Rev:

24/04/2019 5:16:47 PM

Luminaire parts list									
Index	Manufacturer	Luminaire type	Item number	Fitting	Luminous flux	Light loss factor	Connected load	Mounting Height	Quantity
P1	AEC ILLUMINAZIONE SRL	MOD 2.0 URBAN 200 0F2H S05 3.7-2M	MOD 2.0 URBAN 200 0F2H S05 3.7-2M	1xL-MD2-0F2H1-3000-700-2M-70-25	4390 lm	0.83	40 W	6000mm	21

P1 MOD 2.0 URBAN

MOD 2.0 URBAN 200

200 x 80

Larghezza (Width - Largeur) 200mm

Altezza (Height - Hauteur) 80mm

Luminaire parts list								
Index	Manufacturer	Article name	Item number	Fitting	Luminous flux	Light loss factor	Connected load	Quantity
S1	BRIGHT LIGHT	12W 24V NEON ARC WARM WHITE LED	BL-LS-4800-27	60x5050, 3000K, IP68, DIMMABLE	420 lm/m	0.75	12 W/m	535m
S1 Alternate	ACCLAIM (IMPRESSIONS LIGHTING)	FLEX TUBE SE SC 3K	FLEX TUBE SE SC 3000K 24V DC	3000K, IP68, DIMMABLE	171 lm/f	0.75	3.3 W/f	535m
R1	GHIDINI (IMPRESSIONS LIGHTING)	Segno Sq 45 2W Led 3K flood 47°	1008.BDM.T	LED 3000K	225 lm	0.75	2 W	112
R2	GHIDINI (IMPRESSIONS LIGHTING)	Segno Walk 45 1.5W 3K	1381.BAX.T	LED 3000K	170 lm	0.75	1.5 W	22

S1 NEON ARC

R1 SEGNO SQ 45

R2 SEGNO WALK 45

General Note:
Drawings are for information purposes only, do not scale off drawing

Rev	Description	Date
1	Revision 1	19.04.23

Purpose of Issue: Tender

Project: Rotorua Lakefront

Title: Stage 1 & 1A Luminaire Schedules

Client: Rotorua Lakes Council

Drawn by: BW | Reviewed by: RS | Date: 18.04.2019

Scale @ A3: 1:450 | Project number: S18-037

Drawing number: S18-037- E11 | Rev: 1

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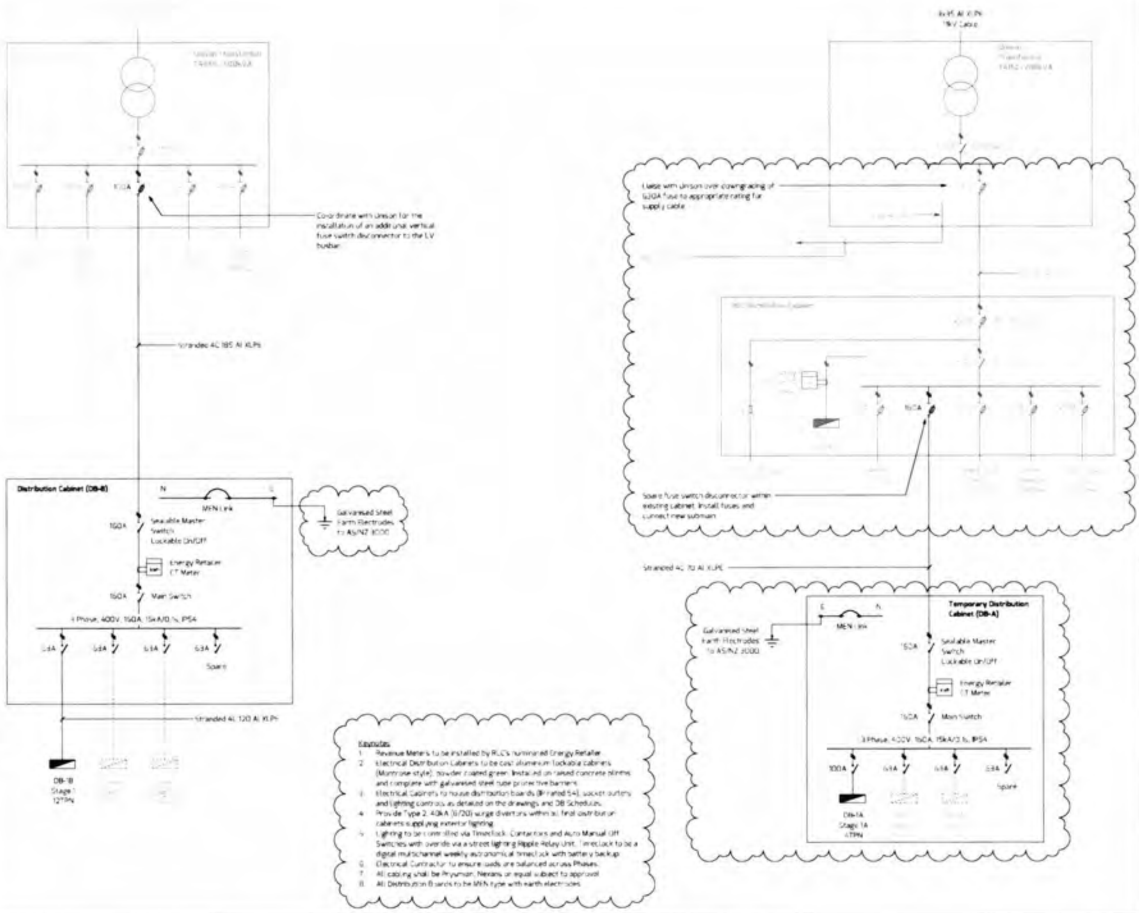

Keynotes:
1. Revenue Meters to be installed by RLC's nominated Energy Retailer.
2. Electrical Distribution Cabinets to be cast aluminium lockable cabinets (Montrose style), powder coated green. Installed on raised concrete plinths and complete with galvanised steel tube protective barriers.
3. Electrical Cabinets to house distribution boards (IP rated 54), socket outlets and lighting controls as detailed on the drawings and DB Schedules.
4. Provide Type 2, 40kA (8/20) surge divertors within all final distribution cabinets supplying exterior lighting.
5. Lighting to be controlled via Timeclock, Contactors and Auto Manual Off Switches with override via a street lighting Ripple Relay Unit. Timeclock to be a digital multichannel weekly astronomical timeclock with battery backup.
6. Electrical Contractor to ensure loads are balanced across Phases.
7. All cabling shall be Prysmian, Nexans or equal subject to approval.
8. All Distribution Boards to be MEN type with earth electrodes.

General Note:
Drawings are for information purposes only, do not scale off drawing

Rev	Description	Date
1	Revision 1	19.04.23

Purpose of Issue: Tender

Project: Rotorua Lakefront

Title: Stage 1 & 1A Electrical Schematics

Client: Rotorua Lakes Council

Drawn by: BW | Reviewed by: RS | Date: 18.04.2019

Scale @ A3: 1:100 | Project number: S18-037

Drawing number: S18-037- E12 | Rev: 1

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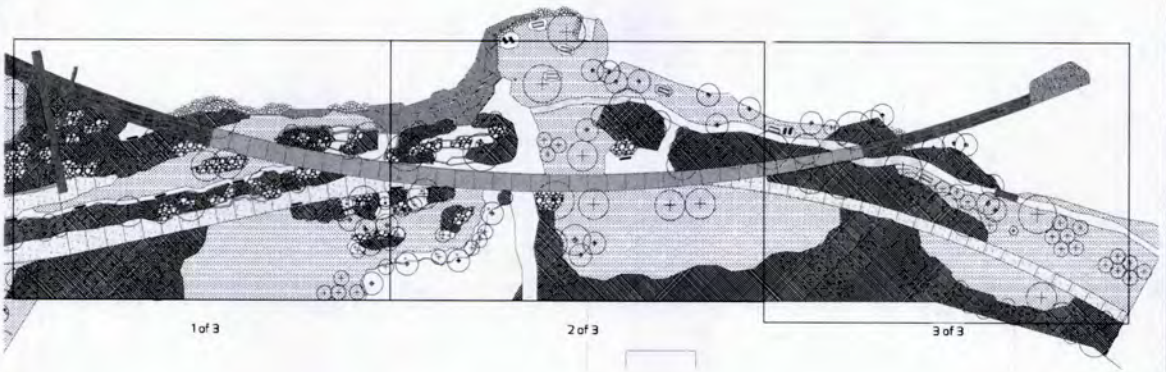

General Note:
Drawings are for information purposes only, do not scale off drawing

Rev	Description	Date

PURPOSE OF ISSUE
Tender

CONSULTANT
SEG
Suite Ltd, Level 1, 75 Elizabeth Street, Tauranga, 3110

PROJECT
Rotorua Lakefront

TITLE
Stage 1 Overview

CLIENT
Rotorua Lakes Council

DRAWN BY	REVIEWED BY	DATE
BW	RS	18.04.2019

SCALE @ A1	PROJECT NUMBER
1: 450	518-037

DRAWING NUMBER: 518-037- E13 | REV:

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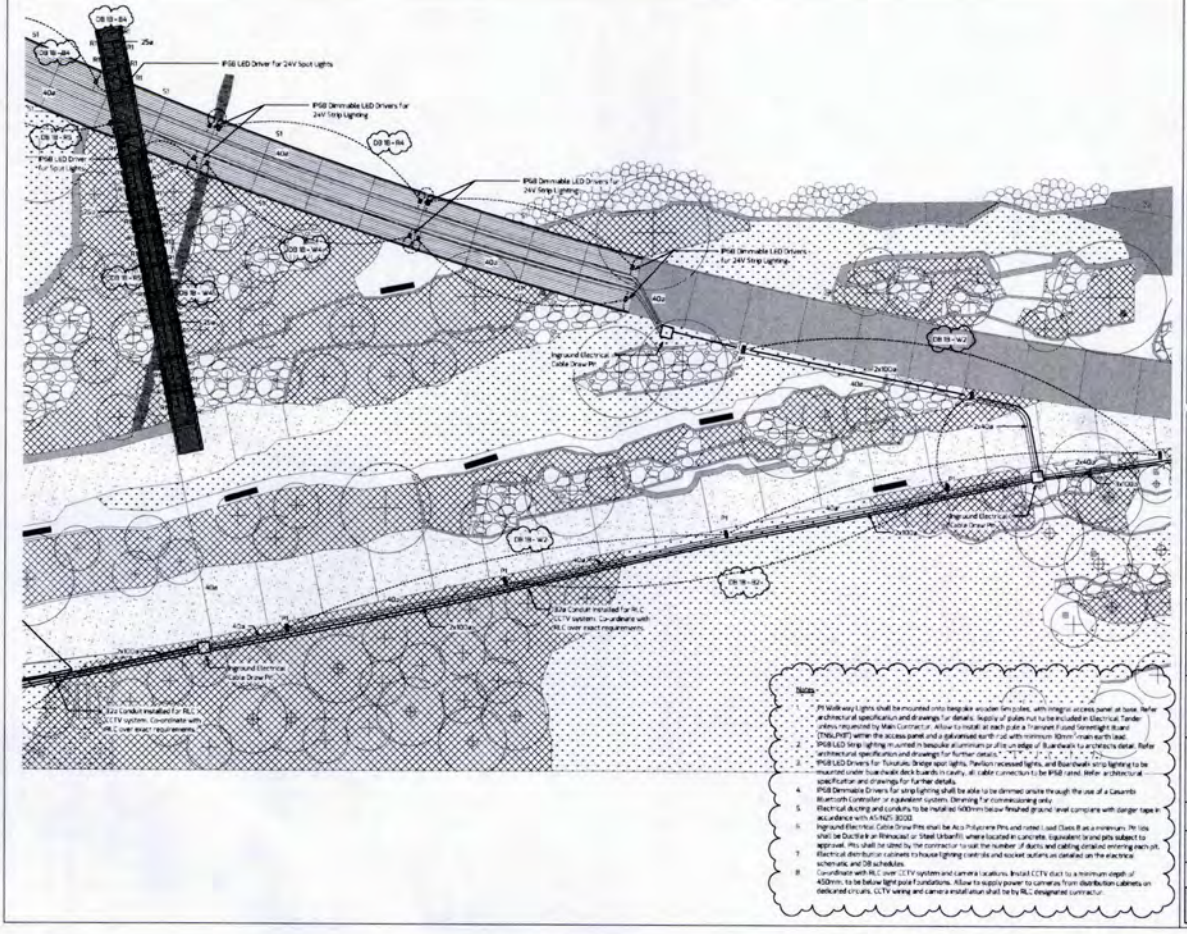

General Note:
Drawings are for information purposes only, do not scale off drawing

Rev	Description	Date
1	Revision 1	19.04.23

PURPOSE OF ISSUE
Tender

CONSULTANT
SEG
Suite Ltd, Level 1, 75 Elizabeth Street, Tauranga, 3110

PROJECT
Rotorua Lakefront

TITLE
Stage 1 Electrical 1 of 3

CLIENT
Rotorua Lakes Council

DRAWN BY	REVIEWED BY	DATE
BW	RS	18.04.2019

SCALE @ A1	PROJECT NUMBER
1: 150	518-037

DRAWING NUMBER: 518-037- E14 | REV: 1

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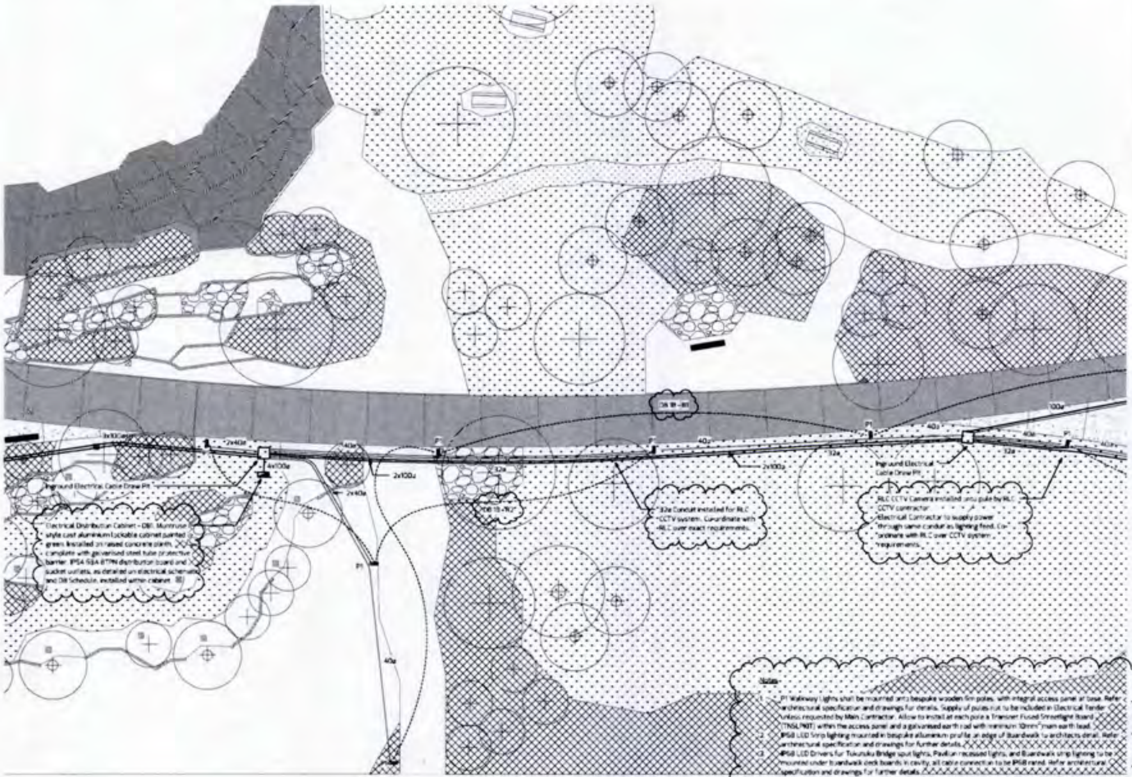

Notes:

1. P1 Walkway Lights shall be mounted onto bespoke wooden 6m poles, with integral access panel at base. Refer architectural specification and drawings for details. Supply of poles not to be included in Electrical Tender unless requested by Main Contractor. Allow to install at each pole a Transnet Fused Streetlight Board (TNSLPKIT) within the access panel and a galvanised earth rod with minimum 10mm² main earth lead.
2. IP68 LED Strip lighting mounted in bespoke alluminium profile on edge of Boardwalk to architects detail. Refer architectural specification and drawings for further details.
3. IP68 LED Drivers for Tukutuku Bridge spot lights, Pavilion recessed lights, and Boardwalk strip lighting to be mounted under boardwalk deck boards in cavity, all cable connection to be IP68 rated. Refer architectural specification and drawings for further details.
4. IP68 Dimmable Drivers for strip lighting shall be able to be dimmed onsite through the use of a Casambi Bluetooth Controller or equivalent system. Dimming for commissioning only.
5. Electrical ducting and conduits to be installed 600mm below finished ground level complete with danger tape in accordance with AS/NZS 3000.
6. Inground Electrical Cable Draw Pits shall be Aco Polycrete Pits and rated Load Class B as a minimum. Pit lids shall be Ductile Iron Rhinocast or Steel UrbanFill where located in concrete. Equivalent brand pits subject to approval. Pits shall be sized by the contractor to suit the number of ducts and cabling detailed entering each pit.
7. Electrical distribution cabinets to house lighting controls and socket outlets as detailed on the electrical schematic and DB schedules.
8. Co-ordinate with RLC over CCTV system and camera locations. Install CCTV duct to a minimum depth of 450mm, to be below light pole foundations. Allow to supply power to cameras from distribution cabinets on dedicated circuits. CCTV wiring and camera installation shall be by RLC designated contractor.

General Note:
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Rev	Description	Date
1	Revision 1	19.04.23

Purpose of Issue: Tender

Consultant: SEG — SEG Ltd, Level 1, 75 Elizabeth Street, Tauranga 3110 NZ

Project: Rotorua Lakefront

Title: Stage 1 Electrical 2 of 3

Client: Rotorua Lakes Council

Drawn by	Reviewed by	Date
BW	RS	18.04.2019

Scale @ A3	Project Number
1:150	S18-037

Drawing Number	Rev
S18-037- E15	1

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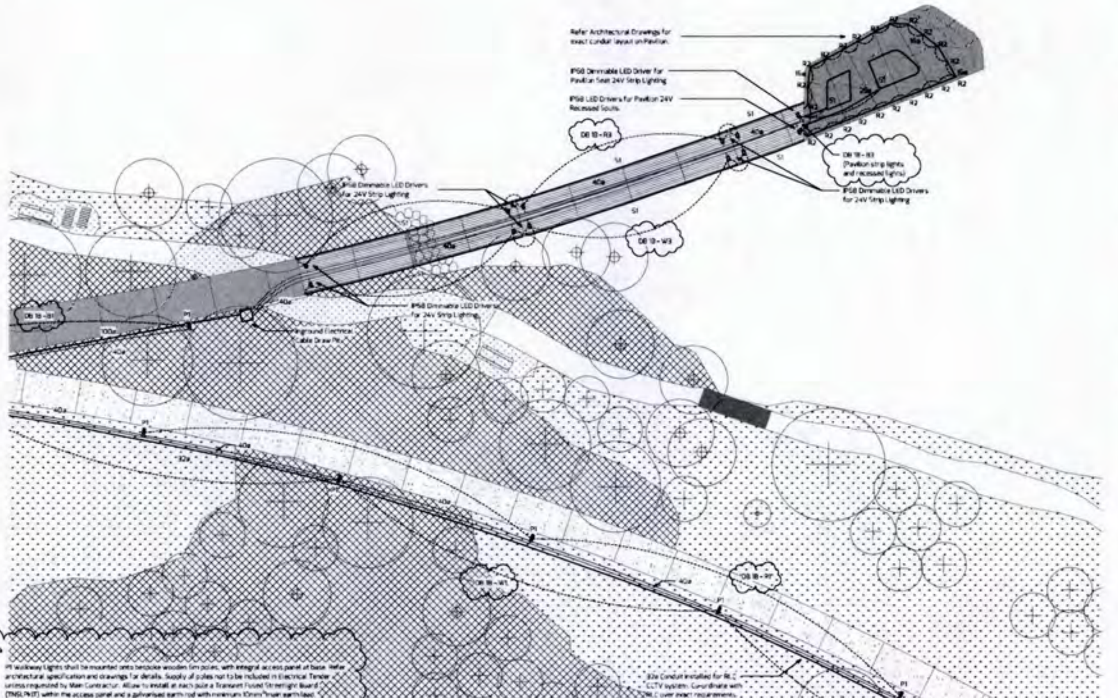

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2. IP68 LED Strip lighting mounted in bespoke alluminium profile on edge of Boardwalk to architects detail. Refer architectural specification and drawings for further details.
3. IP68 LED Drivers for Tukutuku Bridge spot lights, Pavilion recessed lights, and Boardwalk strip lighting to be mounted under boardwalk deck boards in cavity, all cable connection to be IP68 rated. Refer architectural specification and drawings for further details.
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Rev	Description	Date
1	Revision 1	19.04.23

Purpose of Issue: Tender

Consultant: SEG — SEG Ltd, Level 1, 75 Elizabeth Street, Tauranga 3110 NZ

Project: Rotorua Lakefront

Title: Stage 1 Electrical 3 of 3

Client: Rotorua Lakes Council

Drawn by	Reviewed by	Date
BW	RS	18.04.2019

Scale @ A3	Project Number
1:150	S18-037

Drawing Number	Rev
S18-037- E16	1

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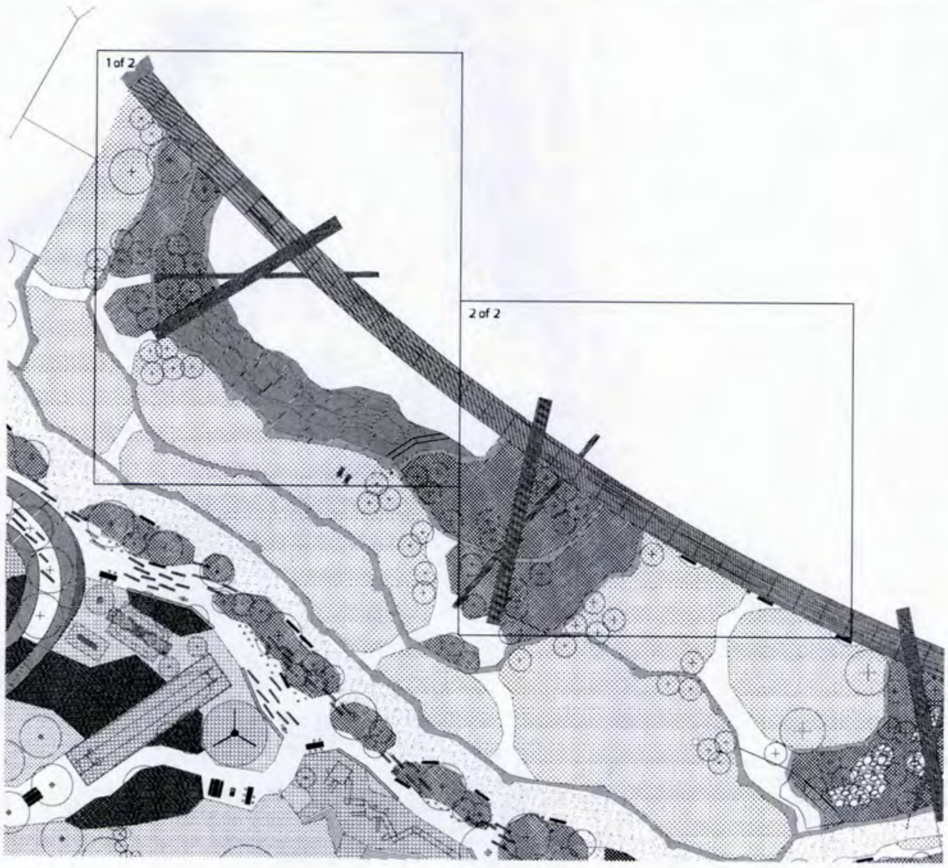


General Note:
Drawings are for information purposes only, do not scale off drawing

Rev	Description	Date

PURPOSE OF ISSUE: Tender

CONSULTANT: SEG — SEG Ltd, Level 1, 75 Elizabeth Street, Tauranga. SEG.nz

PROJECT: Rotorua Lakefront

TITLE: Stage 1A Overview

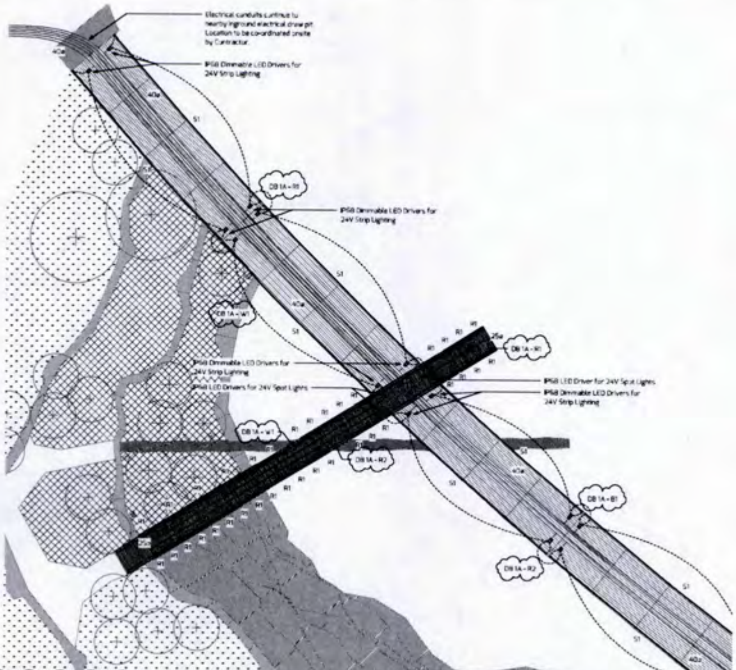
CLIENT: Rotorua Lakes Council

DRAWN BY: BW | REVIEWED BY: RS | DATE: 18.04.2019

SCALE (@ A3): 1 : 300 | PROJECT NUMBER: 518-037

DRAWING NUMBER: 518-037- E17 | REV:

24/04/2019 5:17:03 PM



Notes:

1. P1 Walkway Lights shall be mounted onto bespoke wooden 5m poles, with integral access panel at base. Refer architectural specification and drawings for details. Supply of poles not to be included in Electrical Tender unless requested by Main Contractor. Allow to install, at each pole a Transnet Fused Streetlight Board (TNSLPNBT) within the access panel and a galvanised earth rod with minimum 10mm² main earth lead.
2. IP68 LED Strip lighting mounted in bespoke aluminium profile on edge of Boardwalk to architects detail. Refer architectural specification and drawings for further details.
3. IP68 LED Drivers for Tuscutaku Bridge spot lights, Pavilion recessed lights, and Boardwalk strip lighting to be mounted under boardwalk deck boards in cavity, all cable connection to be IP68 rated. Refer architectural specification and drawings for further details.
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Rev	Description	Date
1	Revision 1	19.04.23

PURPOSE OF ISSUE: Tender

CONSULTANT: SEG — SEG Ltd, Level 1, 75 Elizabeth Street, Tauranga. SEG.nz

PROJECT: Rotorua Lakefront

TITLE: Stage 1A Electrical 1 of 2

CLIENT: Rotorua Lakes Council

DRAWN BY: BW | REVIEWED BY: RS | DATE: 18.04.2019

SCALE (@ A3): 1 : 150 | PROJECT NUMBER: 518-037

DRAWING NUMBER: 518-037- E18 | REV: 1

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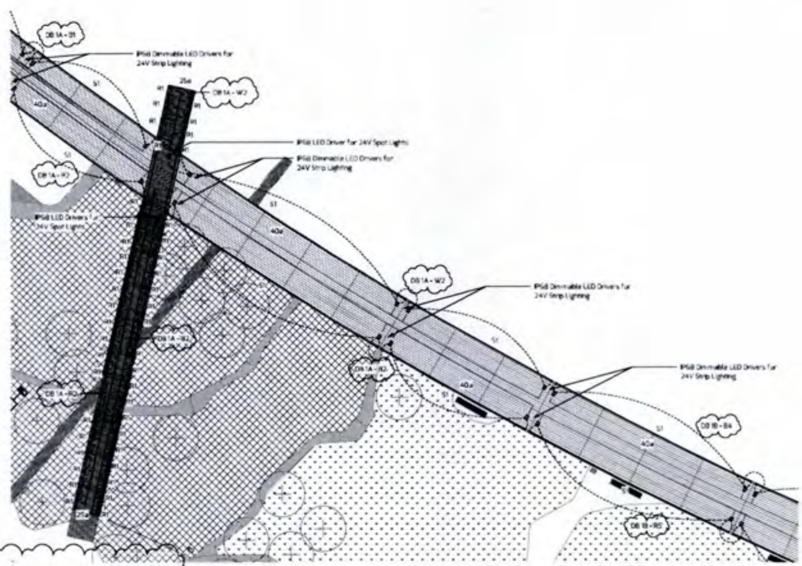

Notes

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Rev	Description	Date
1	Revision 1	19.04.23

PURPOSE OF ISSUE: Tender

CONSULTANT: SEG — SEG Ltd, Level 1, 75 Elizabeth Street, Tauranga [illegible]

PROJECT: Rotorua Lakefront

TITLE: Stage 1A Electrical 2 of 2

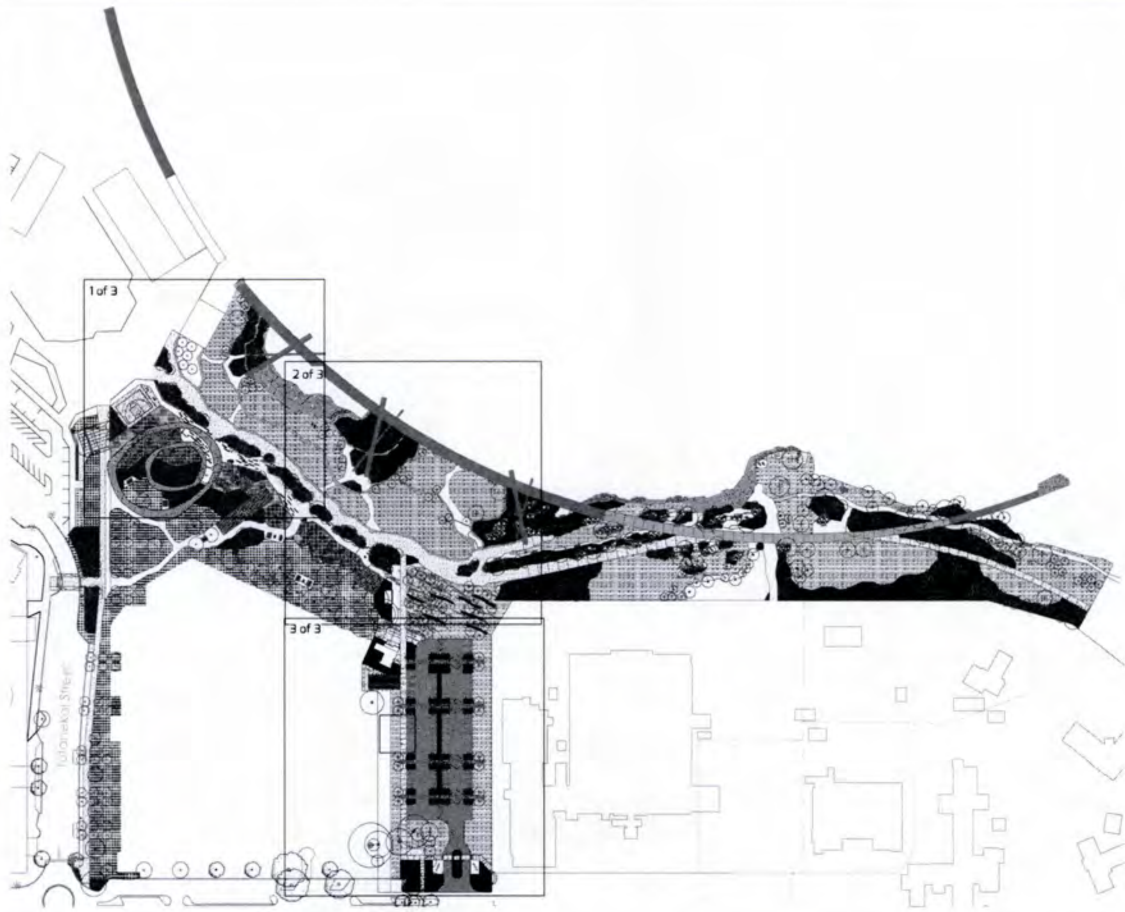
CLIENT: Rotorua Lakes Council

DRAWN BY	REVIEWED BY	DATE
BW	RS	18.04.2019

SCALE @ A3: 1:150 | PROJECT NUMBER: S18-037

DRAWING NUMBER: S18-037- E19 | REV: 1

24/04/2019 5:17:13 PM



General Note:
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Rev	Description	Date

PURPOSE OF ISSUE: Tender

CONSULTANT: SEG — SEG Ltd, Level 1, 75 Elizabeth Street, Tauranga [illegible]

PROJECT: Rotorua Lakefront

TITLE: Stage 1 & 1A Future Stages Overview

CLIENT: Rotorua Lakes Council

DRAWN BY	REVIEWED BY	DATE
BW	RS	18.04.2019

SCALE @ A3: 1:850 | PROJECT NUMBER: S18-037

DRAWING NUMBER: S18-037- E20 | REV:

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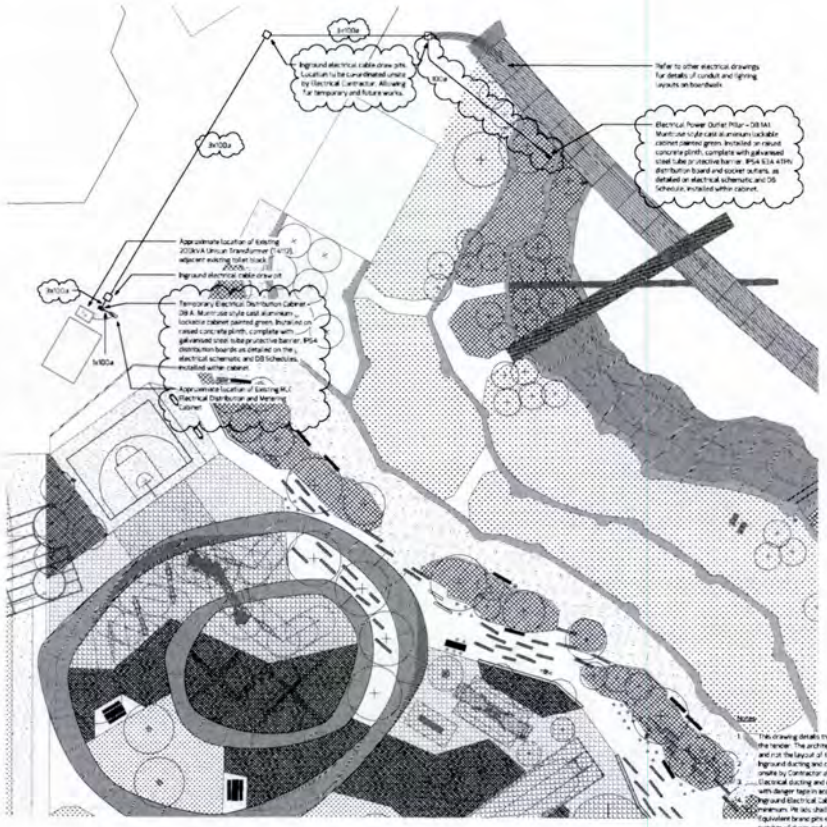

Notes:

1. This drawing details the work required to supply power to Stage 1 and 1A and shall be included in the tender. The architectural background indicates the proposed design for the future stages and not the layout of the existing site or during the proposed works and is subject to change.
2. Inground ducting and cable draw pit locations are indicative only and shall be co-ordinated onsite by Contractor allowing for existing, temporary and future works.
3. Electrical ducting and conduits to be installed 600mm below finished ground level complete with danger tape in accordance with AS/NZS 3000.
4. Inground Electrical Cable Draw Pits shall be Aco Polycrete Pits and rated Load Class B as a minimum. Pit lids shall be Ductile Iron Rhinocast or Steel Unbrako where located in concrete. Equivalent brand pits subject to approval. Pits shall be sized by the contractor to suit the number of ducts and cabling detailed entering each pit.
5. Coordinate with RLC power CCTV system and camera locations. Install CCTV duct to a minimum depth of 450mm, to fall below light pole Foundations. Allow to supply power to cameras from distribution cabinets on dedicated circuits. CCTV wiring and camera installation shall be by RLC designated contractor.

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Rev	Description	Date
1	Revision 1	18.04.23

PURPOSE OF ISSUE: Tender

CONSULTANT: SEG

PROJECT: Rotorua Lakefront

TITLE: Stage 1 & 1A Electrical Future Stages 1 of 3

CLIENT: Rotorua Lakes Council

DRAWN BY	REVIEWED BY	DATE
BW	RS	18.04.2019

SCALE @ A1	PROJECT NUMBER
1: 250	S18-037

DRAWING NUMBER: S18-037- E21 REV: 1

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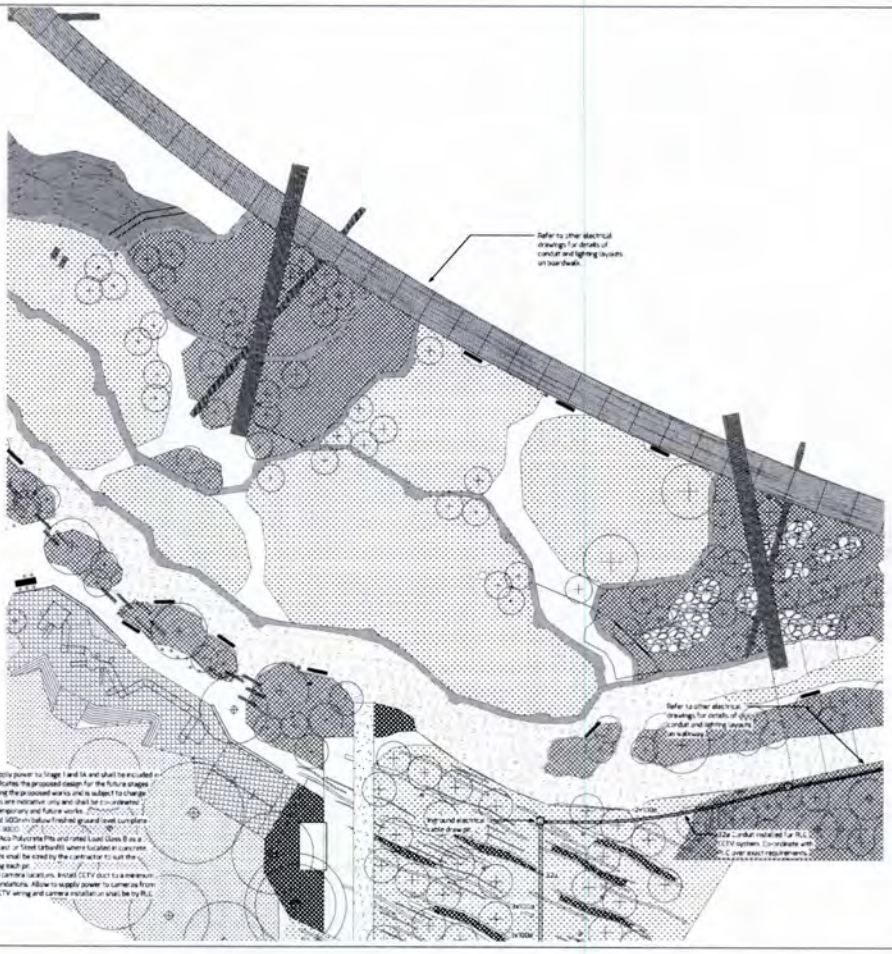

Notes:

1. This drawing details the work required to supply power to Stage 1 and 1A and shall be included in the tender. The architectural background indicates the proposed design for the future stages and not the layout of the existing site or during the proposed works and is subject to change.
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General Note:
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Rev	Description	Date

PURPOSE OF ISSUE: Tender

CONSULTANT: SEG

PROJECT: Rotorua Lakefront

TITLE: Stage 1 & 1A Electrical Future Stages 2 of 3

CLIENT: Rotorua Lakes Council

DRAWN BY	REVIEWED BY	DATE
BW	RS	18.04.2019

SCALE @ A1	PROJECT NUMBER
1: 250	S18-037

DRAWING NUMBER: S18-037- E22 REV:

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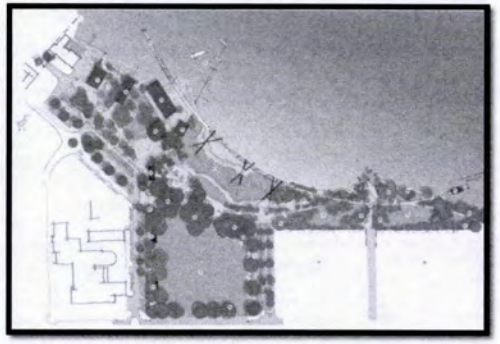


ROTORUA CBD LAKEFRONT DEVELOPMENT

STAGE 1, STAGE 1A

ELECTRICAL SPECIFICATION

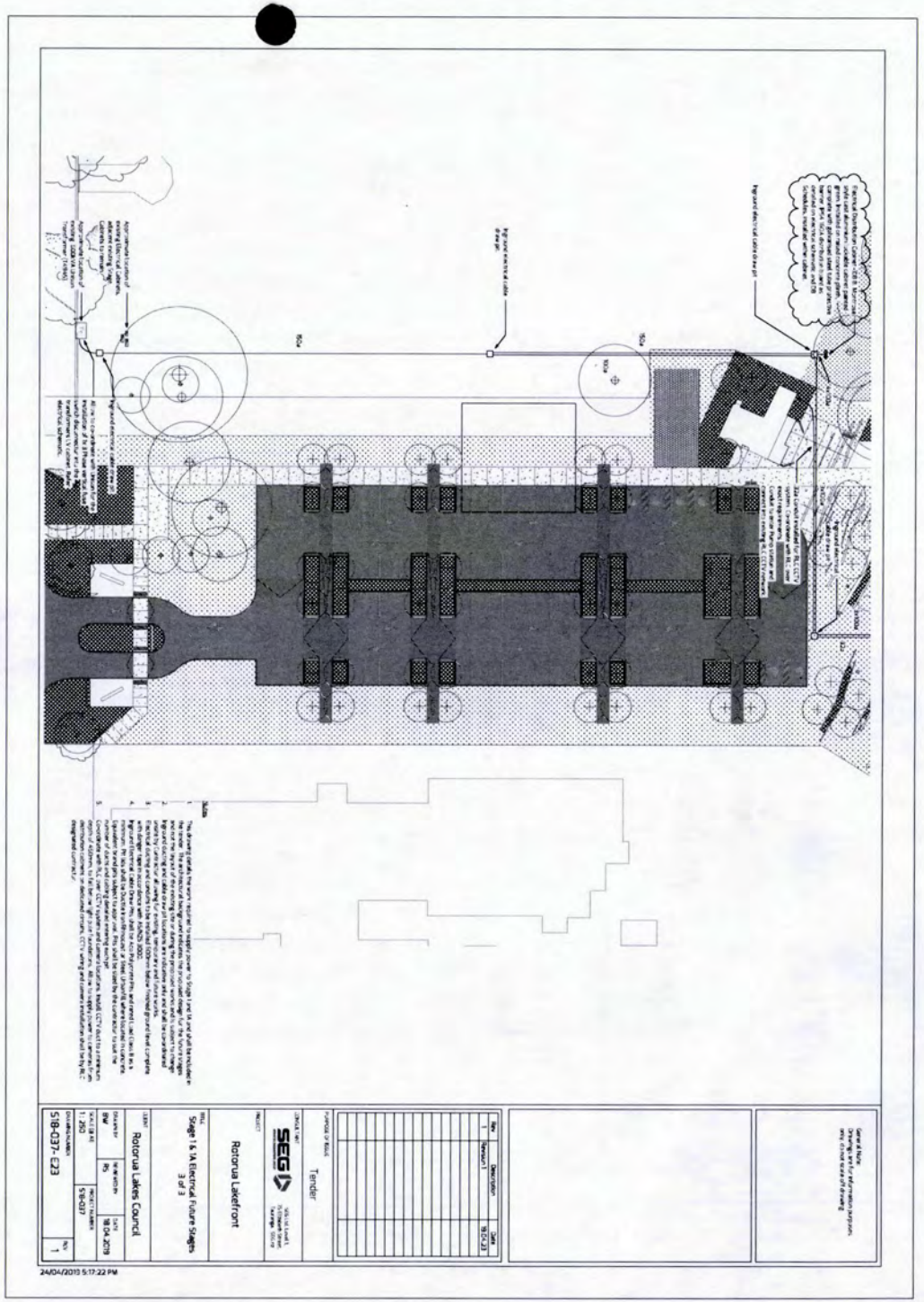
REFERENCE: S18-037-ES 23 APRIL 2019

ISSUE: TENDER

REVISION: 1

E info@seg.nz | P (07) 808 5432 | A Level 1, 75 Elizabeth Street, Tauranga | SEG.nz

SEG
SERVICES ENGINEERING GROUP



2 DEFINITIONS, PRELIMINARY AND CONTRACT

2.1 PROJECT DESCRIPTION

The Rotorua Lakefront is getting a makeover for the community and visitors to the city to enjoy. The overall redevelopment includes several developments such as a play area, new boardwalk, car parking, a new whare waka for the Te Arawa Canoe, concrete and grass terraces and a cafe and restaurant area. The redevelopment of the Lakefront will provide the catalyst for further investment as well as creating a space that celebrates Rotorua's unique environment and culture.

This specification and associated drawings incorporates the first two stages of the development, Stage 1 and Stage 1A.

2.2 DEFINITIONS AND ABBREVIATIONS:

EC	Electrical Contractor (the Contractor)
GC	General Contractor
BCA	Building Consent Authority
RLC	Rotorua Lakes Council

2.3 CONTRACT DOCUMENTS

All contract documents should be read in conjunction. If discrepancies between the Contract Documents are noticed, the author of documents should be contacted for clarification. In general, the documents should follow the below order of precedence set out in the particular conditions of contract.

- Contract Particular Conditions
- Contract General Conditions
- Drawings
- Specifications
- Contractors Proposal(s)

2.3.1 CONSTRUCTION PROGRAMME

Refer to the Contract General and Particular Conditions for the programme and milestones. Conditions related to the Contractors requirements and submittals are contained within these documents.

2.4 CONTRACT DRAWINGS

Refer to the SEG Tender electrical drawings for general form and layout of design solutions.

Refer to the Unison Network drawings for existing electrical distribution in the general lakefront area.

Refer to RLC CCTV camera layout drawings.

Refer to Isthmus Architecture drawings.

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Strip lighting shall be dimmable and set at 50% output during commissioning. Additional output to be used to keep similar light levels over luminaire life allowing for maintenance factors. It is proposed that the lights shall be dimmed via a wireless control system such as Casambi Bluetooth.

General Walkway Lighting

The land based connecting walkways are to be illuminated by floodlights installed on bespoke wooden poles to the Architects specification. Refer architectural drawings and specification for further details.

Install within each pole a fused streetlight board rated to 32A consisting of an isolating device, circuit protection, an earth and neutral bar and MEN link. Provide a galvanised steel earth electrode for each pole with a minimum 10mm² earth lead, if a copper main earth lead is utilised it shall be protected from the geothermal effects.

Boardwalk Lighting

The Boardwalk is to be illuminated by linear strip lighting built into the boardwalk edge installed in a custom aluminium profile, as specified by the architect. Strip lighting LED Drivers are to be mounted underneath the boardwalk planks with IP68 ingress protection and shall be accessible for service and maintenance.

Power supplied to drivers by cabling running in conduits installed under the boardwalk decks. The cabling route between driver and strip light to be formed onsite by drilling and cutting through the concrete as per the architectural detailing.

Tukutuku Bridge Lighting

The Tukutuku bridges are to be illuminated by small recessed spot lights mounted into the vertical edging and shining in on the walkway to create an alternating pattern detail. Drivers are to be mounted underneath the boardwalk/tukutuku deck with appropriate ingress protection (IP68) and be accessible for service and maintenance.

Power supplied to drivers and spot lights by cabling running in conduits installed under the boardwalk decks. The cabling route between conduit and spot light to be via onsite drilling of the timber framing as per the architectural detailing.

Pavilion Lighting

The Pavilion shall be illuminated by strip lighting installed into the bottom edge of the pavilion seating with custom aluminium profile as specified by architect and inground recessed walkover LED lights around the outside edges.

Drivers are to be mounted underneath the boardwalk deck with appropriate ingress protection (IP68) and accessible for service and maintenance. The link between driver and strip lighting and driver and recessed walkover lights is to be drilled and channelled onsite through the concrete as per the architectural detailing.

CCTV

Co-ordinate with the Rotorua Lakes Council over the CCTV system requirements and camera locations. Provide conduits and draw pits as detailed on the drawings or as required by RLC. Provide power supplies for CCTV optical converters and camera power supply units as detailed on drawings or as required by RLC from local distribution cabinets utilising electrical conduits installed for pole light wiring. CCTV fibre wiring and camera installation is to be by the RLC's designated provider.

3 SCOPE AND COORDINATION

3.1 SCOPE

3.1.1 SYSTEM NARATIVE DESCRIPTION

SEG Ltd has been engaged by Rotorua Lakes Council to provide detailed design services as detailed in the NZ Construction Industry Council guidelines.

Power Supply

The power is to be supplied from the Unison Network. There are two existing transformers within the vicinity of the site which are proposed to be connected into. The Electrical Contractor shall allow to co-ordinate with Unison over the proposed works.

Electrical Cabinets

All electrical distribution cabinets are to be approximately located as per the drawings. All cabinets shall meet RLC requirements, be cast aluminium (Montrose style) enclosures, powder coated green to match the existing lakefront electrical cabinets, installed on a raised concrete plinth and be suitable for installation in a geothermal environment. Cabinets shall be provided with lockable doors, keyed to match the RLC Lakefront master key. Galvanised steel tubular pipe shall be installed around the cabinet and bolted to the concrete plinth for protection.

Within the electrical cabinet's distribution boards shall be installed with a minimum IP rating of 54 and as detailed on the distribution board schedules and electrical schematics. Distribution boards supplying lighting and power outlets shall be fitted with Type 2 40kA (8/20) surge arrestors. Allow for a sufficiently sized cabinet to house lighting controls and separate cabinet for the mounting of sockets outlets to the face.

Each distribution board shall be MEN type and be provided with an earth electrode system complying with NZS3000 and be less than 10ohm impedance to the general mass of earth to ensure correct operation of surge devices. Earth electrodes shall be 2000mm long, 16mm diameter galvanised steel rods, number of rods and or ground enhancement material as required to achieve desired impedance.

Distribution

Distribution is to be provided through underground ducting and conduits generally as indicated on the drawings.

Cabling shall be sized as detailed with a minimum cable size for lighting sub-circuits of 6mm². Refer DB schedules for details.

Extra low voltage 24V wiring from LED Drivers to strip lighting, recessed lights and spot lights shall be determined by the Electrical Contractor.

Lighting Controls

Lighting to be controlled via a street lighting ripple relay unit in combination with a digital multichannel weekly astronomical timeclock with battery backup and auto/manual/off switches controlling contactors. Refer DB schedules for details.

3.2 COORDINATION

3.2.1 EDBC AND BUILDER

Item	Electrical Contractor	General Contractor
Trenching	Lay conduits and ducting, cable protection and marking strips.	Dig trench to required depth, level, Reinstate and compact trench in accordance with civil specification.
Pillars and pits.	Define exact locations and sizes of pillars and pits. Ensure level with final landscaping details. Protect from damage.	Coordinate locations and landscaping up to specified locations.
Light Fixtures	Run cables, place drivers and light fixtures.	Provide access and space for the running of cable and drivers.
Light poles	Provide conduit for areas passing through and into light pole mounting pad.	Provide location for earthing connection in mounting pads as per design drawings.
Temporary Power	Provide temporary power as per the requirements of users.	Use temporary power under instruction of the installer.

3.1.2 CONTRACTORS SCOPE

The electrical system is to be completed following a design build methodology in accordance with NZS 3916:2013 with the Electrical Design Build Contractor (EDBC) responsible for the design, coordination, supply, installation, quality control, commissioning, testing and handover documents of the complete electrical system. The scope includes but is not limited to:

Design
Review and comment on Consultants design drawings.
Value engineering together with the client.
Submission of shop drawings, equipment and material approvals.
Supply and Installation
Temporary works as required to complete overall works.
Site coordination with General Contractor and other trades.
Supply and install complete electrical panels and switchboards.
Supply and install reticulated electrical wiring, ducting and conduits
Supply and install exterior lighting.
Penetrations for, sealing of, support and restraint of systems.
Compliance documentation as required by project manager.
Finishing
Commissioning and testing of all equipment and systems.
As-built drawings, Operation and Maintenance Manuals.
12 month defects liability and planned maintenance period.

4.2.2 BUILDING CONSENT COMPLIANCE

It is an offence under the Building Act 2004 to carry out any work not in accordance with the building consent, to carry out Restricted Building Work by anyone other than a Licensed Building Practitioner licensed for that type of work.

The resolution of matters concerning building code compliance to be referred to the contract administrator for a direction and then if required to the BCA for consent.

Where any alteration is requested by the territorial authority or any other authority, do not undertake such alteration until the matter has been referred to the contract administrator for direction.

4.2.3 PROJECT PERSONNEL

Provide names and contact details of the contractor's key personnel and tradespersons who are involved with the project. Review the list once a month and reissue it if changes have been made.

4.2.4 PRODUCER STATEMENTS

When producer statements verifying construction are required, provide copies to both the Building Consent Authority and the Contract Administrator. Provide producer statements in the form required by the BCA.

4.2.5 DOCUMENTATION REQUIRED FOR CODE COMPLIANCE

Information may be required either as a condition of the contract documents or as a condition of the building consent. It may include the following:

- Applicators approval certificate from the manufacturer / supplier
- Manufacturer's / supplier's warranty
- Installer / applicator's warranty
- Producer Statement - Construction from the applicator / installer
- Producer Statement - Construction review from an acceptable suitably qualified person

Refer to the general sections for the requirements for compliance information to be provided by the contractor.

Refer to the building consent for the requirements for compliance information to be provided by the contractor.

Obtain required documents from the relevant parties for delivery to the contract administrator after the final inspection has been carried out by the BCA.

4.2.6 ACCEPTABLE PRODUCT/MATERIAL SUPPLIERS

Where a product or material supplier is named, the product/material must be provided by the named supplier. Where more than one named supplier, any one of the named suppliers will be acceptable.

4.2.7 NO SUBSTITUTIONS

Where specifically stated in a section, substitutions are not permitted to any of the specified systems, components and associated products listed in that section.

4 GENERAL REQUIREMENTS

4.1 COMPLIANCE

4.1.1 COMPLY WITH REGULATIONS

Comply with the Gas (Safety and Measurement) Regulations 2010, Electricity Act 1992, Electricity (Safety) Regulations 2010, AS/NZS 3000 and the network utility operator's requirements. Arrange and pay for the required inspections of listed work.

4.1.2 ELECTRICAL CERTIFICATE OF COMPLIANCE

Supply a certificate of compliance to the owner, as required by the Electricity (Safety) Regulations (2010) regulation 67, within 20 days of completion as required by regulation 69.

- Arrange for an inspector to inspect as required by regulation 70, listed work inspection, polarity check and supply becoming live.

4.1.3 SAFETY CHECKS

Arrange for the required safety checks by a registered electrical inspector of the electrical installation and continuing safety checks required for this electrical installation and appliances under the Electricity (Safety) Regulations 2010.

4.1.4 PRODUCER STATEMENTS

Provide a (PS3) "producer statement - construction" to the satisfaction of the Building Consent Authority, for the complete electrical installation and where relevant for any electrical works where the scope has involved system design, provide a (PS1) "producer statement - design", covering relevant works.

4.1.5 COMPLIANCE SCHEDULES

Provide compliance schedules for the installation to the satisfaction of the territorial authority, in accordance with the requirements for the complete electrical installations.

4.2 DOCUMENTATION

This general section relates to documentation required by the Territorial Authority/Building Consent Authority for compliance with the New Zealand Building Code. It also includes documentation relating to:

- Substitutions
- Manufacturers documents

4.2.1 BUILDING CONSENT

Obtain the building consent forms and documents from the owner and keep them on site. Liaise with the BCA for all notices to be given and all inspections required during construction to ensure compliance. Return the consent form and documents to the owner on completion.

4.2.8 PROPOSED SUBSTITUTIONS

A substitution may be proposed where specified products are not reasonably available. A substitution may also be proposed by the contractor where the contractor considers a proposed substitution to be an alternative to the specified product. Except where a specified product is not available, the contract administrator is not bound to accept any substitutions. Where branded work sections are included in this specification, substitution of those products or systems will not be allowed.

4.2.9 NOTIFICATION OF SUBSTITUTIONS

Notify proposed substitution of specified products. Notification to include but not be limited to:

- Product identification
- Manufacturer's name, address, telephone number, website and email address
- Detailed comparison between the properties and characteristics of the specified product and the proposed substitution
- Statement of NZBC compliance including durability
- Details of manufacturer warranties

Plus, an assessment of:

- Any changes required to the programme including any extension of time required
- Any consequential effects of the proposed substitution
- Any effect the substitution may have on Health & Safety requirements
- Allowance for time and cost for re-design and documentation (if applicable)
- Allowance for time and cost for obtaining an amendment to the Building Consent (if applicable)
- Any change in cost associated with the proposed substitution

and if requested:

- All current manufacturer's literature on the product
- Accreditations and appraisals available
- Reference standards
- Product limitations
- Samples
- List of existing installations in the vicinity of the project

4.2.10 ACCEPTANCE OF SUBSTITUTIONS

The Contract administrator must advise of acceptance of substitutions in writing.

4.2.11 CONTRACTOR VARIATION TO BUILDING CONSENT

Where the contractor has sought acceptance of a substitution or a variation which is for the contractor's own convenience and the substitution or variation requires an amendment to the Building Consent, the contractor must apply for and obtain the required amendment.

The contractor must:

- Obtain approval for substitutions from the contract administrator.
- Prepare and provide to the BCA all documentation required for the variation.
- Pay all fees and other costs associated with this amendment.
- Where the amendment affects other approved plans, also amend those plans.

4.2.12 PRINCIPALS VARIATION TO BUILDING CONSENT

Where the principal is proposing a substitution or a variation which requires an amendment to the Building Consent, the contractor must provide to the principal information that the contractor has that is required for the amendment.

The principal will:

- Prepare and provide to the BCA all documentation required for the amendment.
- Pay all fees and other costs associated with this amendment.
- Where the amendment affects other approved plans, also amend those plans.

4.2.13 MANUFACTURER'S AND SUPPLIER'S INSTALLATION REQUIREMENTS

Manufacturers and supplier's requirements, instructions, specifications or details means those issued by them for their particular material, product or component and are the latest edition.

4.2.14 CONTRACTOR TO OBTAIN CURRENT DOCUMENTATION

Where manufacturer's installation, application and execution requirements are referred to in this specification, the Contractor must ensure they are fully aware of this documentation. Whenever necessary obtain and keep on site the relevant latest version of such documentation and make it available to workers carrying out that part of the work.

4.2.15 DOCUMENTATION PROVIDED FOR BUILDING CONSENT

Documentation including manufacturer's installation instructions, specification data sheets, producer statements, BRANZ and similar appraisals may be included in the issued Building Consent. These documents have been provided only to demonstrate compliance with the NZBC.

4.2.16 BRANDED WORK SECTIONS

Branded sections may be included in this specification relating to specific products and systems to be installed as part of the contract works. Where branded sections are included, substitutions to the branded products and systems will not be allowed.

4.2.17 CROSS REFERENCED WORK SECTIONS

If any related work is cross referenced to a generic work section, but only the equivalent branded section is included in the specification, use that branded section. Confirm with the contract administrator if there is any doubt.

4.3 DESIGN

4.3.1 SYSTEM DESIGN, POWER

The complete electrical installation to comply with AS/NZS 3000, AS/NZS 3439.1 (and other appropriate parts of the standard), AS/NZS 3008 and within the following parameters:

Fault ratings graded to suit the Network Utility Operators (NUO) stated prospective fault level and fully discriminated through the installation.

4.4 DESIGN DELIVERABLES

4.4.1 SHOP DRAWINGS

Provide shop drawings, calculations and other descriptive information for review before commencing manufacture.

Shop drawings to include:

- Seismic restraint details.
- Relevant performance data for each item of equipment including make, model, load, capacity etc., as appropriate.
- Switchboard details and wiring diagrams.
- Related builders work required including, access doors, cast in elements, waterproofing, penetrations and openings, plinths and kerbs etc
- Submit certification that the plant and equipment meets all requirements and capacities of the contract documents unless specifically stated otherwise in the submission.

4.4.2 SHOP DRAWING FORMAT

Prepare shop drawings at appropriate scales to enable good legibility.

4.4.3 PROGRAMME FOR DRAWINGS

Allow time in the programme for the preparation, coordination and review of drawings. Allow also for such resubmission and further review as may be required prior to fabrication. No extension of time will be allowed for resubmission and further review.

4.4.4 COMMUNICATION WITH DRAWING DETAILER

Agree and arrange for such direct contact as is appropriate between detailer, consultant and others whose input may be required in the preparation of the drawings. Such direct communication does not relieve the contractor of the need to carry out their own coordination and check of drawings.

4.4.5 CONTRACTOR COORDINATION OF DRAWINGS

Before submitting the drawings for review, carry out coordination to ensure that allowance has been made for all other parts of the work that relate to the work detailed in the drawings.

4.4.6 COORDINATION WITH SITE MEASURE

The contractor is solely responsible for coordination of shop drawing dimensions with site measurements. The reviewer's dimensional review is limited to visual/aesthetic matters only

4.4.7 DRAWING REVIEW

Submit drawings to the named reviewers for review, in due time to ensure conformance with the contract programme.

- Where no time is stated in a specific section allow 10 working days for review by the reviewer. Where a large number of drawings are involved more time will be necessary.
- Where no person is named as the reviewer, submit the drawings to the contract administrator.

Voltage drop allowance 5% from point of supply if direct LV. Generally, allow 3% for sub circuits, or as designed within the total % voltage drop allowance.

- Allow for fully fitted out current load (amps) plus the following spare capacity:
  - 10% for mains
  - 20% for main switchboard
  - 25% for submains (10% for fixed loads, lifts, mechanical and similar)
  - 30% for distribution switchboards.
- Cable de-rating factor to AS/NZS 3008.1.2.

4.3.2 SYSTEM DESIGN, LIGHTING

The complete lighting installation to comply with AS/NZS 3000, AS/NZS 1680 and AS/NZS 1158.

4.3.3 DISTRIBUTION AND SWITCHBOARD SYSTEM DESIGN

Comply with AS/NZS 3000 and AS/NZS 3439.1 and other appropriate parts of that standard. Fault ratings graded to suit Network Utility Operators stated prospective fault level fully discriminated through installation.

Allow for fully fitted out current load (amps) plus the following spare capacity:

- 20% for distribution switchboards
- 20% for main switchboards

Detailed certified calculations verifying design characteristics to AS 3865 and AS 60890.

- Main switchboard: form 3 (minimum)
- Distribution boards: form 1

Fault rating graded to suit maximum prospective fault from NUO

- minimum 25kA, 1.0 seconds for main switchboards
- minimum 10kA, 1.0 seconds for distribution switchboards.

Complete, fully wired, certified solution, of sizes to suit space allocated, with clearances required in Standards, designed to give easy access to and removal of component parts.

4.3.4 DESIGN SAFETY

Fully consider the safety of the designed installation in accordance with Safety at Work Act 2015. Safety in design should use risk management techniques to identify installed pieces of equipment which pose a hazard to persons, and minimize, isolate or remove these hazards. Examples include:

- Practical and safe equipment installation procedures
- Provide safe access for servicing of equipment through its life.
- Remove potential slip or trip hazards created by cable runs on rooftop platforms.
- Isolating live electrical connections from public and workers.
- Isolate moving machinery from the public and workers.
- Providing signs to warn of specific dangers

Drawing review indicates only that the shop drawing interpretation of the design concept has been reviewed without the need for further modification, other than the corrections indicated by the reviewer.

The reviewer may advise that:

- The drawings have been reviewed and work may proceed; or
- The drawings have been reviewed and work may proceed subject to notes, annotations or comments provided; or
- The drawings have been reviewed and work may proceed subject to notes, annotations or comments provided. Resubmitted revised drawings shall be provided for the record, or
- Work may not proceed. Revise and resubmit drawings

4.4.8 RESPONSIBILITY

Review of drawings does not relieve the contractor of responsibility for the correctness of the drawings, site dimensions, the overall design, coordination and performance, or for ensuring the work is carried out in compliance with the contract documents. It does not remove the need for the contractor to comply with the stated requirements, details and specifications of the manufacturers and suppliers of individual components, materials and finishes. Review cannot be construed as authorising departures from the contract documents.

4.4.9 RESUBMISSION OF DRAWINGS

Reviewed drawings which are required to be resubmitted to correct comments or notations indicating where the drawings are at variance with the contract documents, are to be modified and resubmitted to the reviewer for re-review. Allow 5 working days for re-review by the reviewer.

4.4.10 WORK MAY PROCEED

Before proceeding with any fabrication, installation or erection, advice must be obtained from the named reviewers that work may proceed. Where no named reviewer has been nominated advice must be obtained from the contract administrator.

4.4.11 DRAWING FORMAT

Submit the drawings in hardcopy A3 and electronic in PDF. If using Revit; additionally, coordinate drawings in the Revit Model.

4.5 PERFORMANCE

4.5.1 QUALIFICATIONS

Installation to be carried out by competent workers, familiar with the materials and the techniques specified.

Carry out all work under the direct supervision of a holder of a practising licence under the Electricity (Safety) Regulations 2010 for Electrical work and NZ Electrical Codes of Practice.

4.5.2 SEALING PENETRATIONS

Seal all penetrations, including in and around conduits and sleeves.

4.5.3 ACCESS OF PLANT AND EQUIPMENT

Locate and arrange all services and equipment so that:

- Inspection and maintenance operations can be arranged to minimise inconvenience and disruption to, or damage to the users of the space.
- Services and equipment are readily accessible for inspection and maintenance and arranged so that inspection and maintenance can be carried out in a safe and efficient manner. Include the following:
- Conform to AS/NZS 1892.1, AS/NZS 2865, AS/NZS 3666.1, NZBC D1/AS1 and WorkSafe; **Guidelines for the provision of facilities and general safety in the construction industry**.
- Modify manufacturer's standard equipment when necessary to provide the plant access in the contract documents.
- For areas, accessible to the public ensure all plant and equipment is secure from unauthorised tampering and or operation.

4.6 ENVIRONMENTAL PROTECTION.

All materials and equipment to be suitably protected and treated to withstand the Rotorua environment and high Hydrogen Sulphide content.

All metallic components are to be as a minimum galvanised to AS/NZS 4680:1999, and then factory coated to AS/NZS 2312:1994 GZLP-C specifications. This will apply to all parts that will not be cast into concrete.

4.7 TEMPORARY WORKS AND SERVICES

This general section relates to temporary works and services required for the construction of the contract works. It includes

- Scaffolding and work platforms
- Trenching
- General care and protection

4.7.1 COMPLY WITH NEW ZEALAND BUILDING CODE

Refer to New Zealand Building Code clauses and approved document paragraphs for the criteria and/or methods that must be used in this section to establish compliance with the code.

4.7.2 COSTS RELATING TO TEMPORARY WORKS

Pay all rates/fees in respect of temporary works.

4.7.3 MAINTENANCE OF TEMPORARY WORKS

Maintain alter, adapt and move temporary works and services as necessary. Clear away when no longer required and make good.

4.7.4 SAFEGUARD THE SITE, THE WORKS AND MATERIALS

Take all precautions to prevent unauthorised access, including access outside working hours, to the site, the works. Safeguard the site, the works, materials and plant from damage and theft.

4.7.5 TEMPORARY ELECTRICITY

To AS/NZS 3012. The name and designation of the person responsible is to be displayed prominently and close to the main switch or circuit breaker.

conditions of the warranty in no case negate the minimum remedies available under common law as if no warranty had been offered. Failure to provide the warranty does not reduce liability under the terms of the warranty called for in that specified section of work.

- Conform to any warranty agreement form included in the specification/conditions of contract.
- Commence warranties from the date of practical completion of the contract works (unless otherwise stated).
- Maintain their effectiveness for the times stated.
- Provide executed warranties prior to practical completion.

Warrant the complete electrical installation under normal environmental and use conditions against failure of materials and execution.

- 1 year: Warranty period

4.10.1 WARRANTIES - INSTALLER/APPLICATOR

Where installer/applicator warranties are offered covering execution and materials of proprietary products or complete installations, provide such warranties to the contract administrator. These warranties may be provided in lieu of the warranties that are otherwise required provided that these warranties are subject to similar conditions and periods.

Provide warranties in favour of the principal. The terms and conditions of such warranties in no case negate the minimum remedies available under common law as if no warranty had been offered. Failure to provide the warranty does not reduce liability for execution and materials for that part of the work.

4.10.2 WARRANTIES - MANUFACTURER/SUPPLIER

Where warranties are offered covering materials, equipment, appliances or proprietary products, provide all such warranties to the contract administrator.

Provide warranties in favour of the principal. The terms and conditions of such warranties in no case negate the minimum remedies available under common law as if no warranty had been offered. Failure to provide the warranty does not reduce liability for execution and materials for that part of the work.

4.10.3 REVIEW BY CONTRACTOR

Obtain the warranties from the installers, applicators, manufacturers and suppliers at the earliest possible date and review to ensure that they are correctly filled out and executed. Where warranties are executed as a deed, ensure that a duplicate copy is provided for execution by the owner/principal. Keep safe and secure until required for submission.

4.10.4 WARRANTIES - REQUIRED BY BUILDING CONSENT AUTHORITY

Obtain copies of warranties required as a condition of the building consent in the form required for submission to the BCA. Keep safe and secure until required at the time of the BCA final inspection and Code Compliance Certificate.

4.10.5 WARRANTIES - REQUIRED BY CONTRACT

Obtain copies of warranties listed in the contract documents. Provide all warranties at the same time. If the project has an operations and maintenance documentation provision, present the warranties with the operations and maintenance information. If no operations and maintenance documentation provision exists,

Inspect and overhaul the installation at such intervals as required but not exceeding three monthly intervals.

4.7.6 GENERAL SCAFFOLDING

Provide as necessary any temporary scaffolding for the efficient execution of the works. General Contractor is to provide the placement, erection and structure to be by certified suppliers/erectors.

4.7.7 MAKE GOOD EXISTING SERVICES

Make good all damage to existing roads, footpaths, grounds, sewers or other services, caused in carrying out the contract works.

4.7.8 PERIODIC SITE CLEANING

Carry out periodic site cleaning during the contract period. Place waste material in appropriate storage pending removal from the site.

4.7.9 PERIODIC RUBBISH REMOVAL

Follow the instructions of the General Contractor for the storage and removal of construction waste material. Where required or appropriate provide for the separate storage of recyclable waste and other materials requiring special disposal. Keep food waste separate from construction waste.

4.8 SITE FACILITIES, ACCESS AND SECURITY

Provide any storage of equipment or materials and all other facilities required for carrying out the Contract works. Only equipment necessary for the execution of the works will be permitted on site.

4.8.1 SECURITY

Comply with the site security provisions. Each Contractors materials and equipment are their own responsibility. No reimbursement will be given for claims related to lost or stolen equipment or materials.

4.9 COMPLETION

Completion shall be as defined in the Contract.

4.9.1 PRACTICAL COMPLETION

Practical Completion is that stage in the execution of the work under the Contract when the Contract Works or any Separable Portion are complete except for minor omissions and minor defects:

(a) Which in the opinion of the Engineer the Contractor has reasonable grounds for not promptly correcting;
(b) Which do not prevent the Contract Works or Separable Portion from being used for their intended purpose; and
(c) Rectification of which will not prejudice the convenient use of the Contract Works or any Separable Portion.

4.10 WARRANTIES

Provide executed warranties in favour of the principal in respect of, but not limited to, materials, components, service, application, installation and finishing called for in that specified section of work. The terms and

Generally, in conformance with NZS 5807 as appropriate, otherwise black lettering on white background except as follows:

- Danger, warning labels: White lettering on red background.
- Main switch and caution labels: Red lettering on white background.

If labels exceed 1.5mm thickness, radius or bevel the edges.

Fix labels securely using screws, rivets, proprietary self-adhesive labels or double-sided adhesive tape.

- If labels are mounted in extruded aluminium sections, use rivets or countersunk screws to fix the extrusions.
- Use aluminium or monel rivets for aluminium labels.

Locate labels so that they are easily seen and are either attached to, below or next to the item being marked.

To correspond to terminology and identifying number of the respective item as shown on the record drawings and documents.

Lettering heights to NZS 5807

Mark to provide a ready means of identification, controls, isolating switches, indicators, gauges, meters and the like.

4.11.4 UNDERGROUND PIPE IDENTIFICATION

Provide 75 x 75 x 3mm screw fixed metal marker plates at electrical cabinets to indicate underground electrical services.

4.11.5 ROUTINE CLEANING

Carry out routine trade cleaning of this part of the work including periodic removal all debris, unused materials and elements from the site.

4.11.6 DEFECTIVE OR DAMAGED WORK

Repair damaged or marked elements. Replace damaged or marked elements where repair is not possible or will not be acceptable. Adjust operation of equipment and moving parts not working correctly. Leave work to the standard required for following procedures.

4.11.7 MAINTAIN

Maintain the complete electrical installation which shall include Manufacturer recommended service interval of items installed. Replace any faulty components.

12 months	Defects liability and Maintenance Period

4.12 GENERAL COMMISIONING

4.12.1 TESTING AND COMMISSIONING

Test and commission the completed installation.

present the warranties to the contract administrator in a loose-leaf binder with a contents index suitably labelled and including the project name and details. Provide a title on the binder edge "Warranties for (project name)"

4.10.6 WARRANTIES - SUBMISSION NZS3916:2013 CONTRACT

Refer to NZS 3916 Conditions of contract for building and civil engineering – Design and construct, clauses 11.5 and 11.6 for requirements relating to the time for submission of warranties and guarantees. Submit all warranties/guarantees to the engineer no later than the date that the contractor notifies that it believes the contract works qualify for practical completion.

4.10.7 SCHEDULE OF WARRANTIES

Provide Schedule of warranties

4.11 FINISHING

4.11.1 PAINTING GENERAL

Where detailed paint new services and equipment. Painting as applicable; to AS/NZS 2311 for general painting, AS/NZS 2312.1 for painting steel, AS/NZS 2312.2 for painting galvanizing. Also conform to manufacturer's requirements and those methods, practices and techniques contained in the Master Painters New Zealand Association Inc. Specification manual, and WorkSafe; Guidelines for the provision of facilities and general safety in the construction industry.

Do not paint chromium or nickel plating, anodised aluminium, GRP, stainless steel, non-metallic flexible materials and normally lubricated machined surfaces. Surfaces with finishes applied off-site need not be re-painted on-site provided the corrosion resistance of the finish is not less than that of the respective finish in this clause.

4.11.2 MARKING

Mark services and equipment to provide a ready means of identification.

- Locations exposed to weather: Provide durable materials.
- Pipes, conduits and ducts: Identify and label to NZS 5807
- Cables: Label to indicate the origin and destination of the cable.

Label and mark equipment using a consistent scheme across all services elements of the project.

Provide marking and labelling text identical to the text and terminology used in operating and maintenance manuals.

4.11.3 LABELS AND NOTICES

Select from the following materials:

- Cast metal.
- Stainless steel or brass ≥ 1mm thick with black filled engraved lettering.

Emergency functions: To NZS/AS 1319.

4.12.7 CALIBRATION AND CERTIFICATION

Use only instruments that have been verified as accurate in accordance with statutory requirements. Provide copies of certification if requested.

Maximum period since last calibration, as recommended by manufacturer but < 12 months, except as noted below.

4.12.8 REPORTS

Submit reports indicating observations and results of tests and compliance or non-compliance with requirements.

4.12.9 NOTICE

Give sufficient notice for inspection to be made of the commissioning of the installation.

4.13 AS-BUILT DOCUMENTATION

Provide the following as built documents and records:

4.13.1 AS-BUILT DOCUMENT REQUIREMENTS

Where requirements for the as built documents and records are not stated in a specific section, they shall include:

As built drawings recording:

- The actual positions as constructed of all, piped and ducted services, electrical services.
- Panel and wiring schematic diagrams
- Inverts and locations of services at key points within the building and at the property lines.
- Dimension services in relation to the structure and building grid lines.
- Field changes of dimensions
- Other significant deviations and changes which are concealed in construction and cannot be identified by visual inspection
- Access doors and panels

Records of:

- Products and materials selected for alternatives specified
- Approved substitutions and accepted alternatives
- Other approved changes and deviations to items specified.

4.13.2 PROVISIONAL AS BUILT DOCUMENTS

Prior to practical completion provide provisional/draft as built documents in sufficient detail to allow the principal to operate, maintain, adjust and re-assemble the contract works and to allow for review by the reviewer. Where no named reviewer has been nominated, submit the as built documentation to the contract administrator. Submit in hard copy and electronic form.

- Equipment and systems to be operated at full capacity to verify proper, safe, efficient operation of all parts of each system. Verify system operation and control meets the design intent and performance requirements before hand over.
- Submit final commissioning report for approval.

4.12.2 TESTING AND COMMISSIONING ELECTRICAL

On completion, test the work in accordance with, the Electricity (Safety) Regulations 2010, AS/NZS 3000, AS/NZS 3017 and other relevant standards. Complete testing prior to energising circuits.

Tests to demonstrate the suitability and proper operation of any item or system are to be made as may be directed during or after manufacture, construction, installation or commissioning up to the end of the guarantee period.

Provide, for the duration of the work, testing and regulating equipment required for commissioning and regulating the completed installation.

Submit the Electrical work for inspection and test and prove to the satisfaction of the network utility operator that the installation complies with all Acts, Regulations and standards and has been tested and proved to be sound.

4.12.3 TRAINING

Provide training and instruction on all systems to the appropriate staff on;

- Maintenance of the installation
- Operation of the installation
- Seasonal requirements
- Use of the Maintenance and Operations Manual

Conduct training, in an agreed format, by agreed persons, at agreed locations and time and to agreed owner's representatives.

4.12.4 COMPLETION PROGRAM

Provide a program consistent with, and forming part of, the construction program. Set out the proposed program for completion, commissioning, testing and instruction. Identify related works and timing of the works pre-requisite to successful and timely completion of the works.

Complete testing and certification of all fire safety measures before occupation of the building.

Revise the program as the project proceeds.

Include time in the program for the running period prior to Practical Completion.

4.12.5 RETESTING

Failure to meet documented performance, identify and correct the cause of failure and repeat the test.

4.12.6 ASSISTING OTHER TRADES

Provide assistance to other trades for testing related systems.

4.13.3 AS BUILT DOCUMENT REVIEW

As built document review indicates only that the reviewer is satisfied that the documents are legible. The review is not a check of the accuracy or completeness of the documents; however the reviewer may comment on any aspect of the documentation and require the documents to be revised and resubmitted. Review of as built documents does not relieve the contractor of responsibility for their correctness.

Where no time is stated in a specific section, allow 10 working days for review by the reviewer. Where a large amount of documentation is involved more time will be necessary.

4.13.4 COMPLETE AS BUILT DOCUMENTS

Prior to the end of the defects notification/liability period, provide complete as built documents reflecting any review requirements, with all information of good quality and properly titled, numbered, cross-referenced and dated. Provide documents in sufficient detail to allow the principal to operate, maintain, adjust and re-assemble the contract works. Submit in hard copy and electronic form to the contract administrator.

4.13.5 AS BUILT DOCUMENTS - ELECTRONIC COPY

Provide an electronic copy of the as built documents in the following format:

Drawings: PDF format (in addition provide DWG files if available)

Other documents: PDF format

4.13.6 NETWORK UTILITY OPERATOR (NUO)

Coordinate and provide required NUO as-built drawings and details.

4.14 OPERATION AND MAINTENANCE

This documentation is required by the principal so that they can operate and maintain the contract works.

4.14.1 OPERATION AND MAINTENANCE INFORMATION

Provide operation and maintenance documentation necessary to operate and maintain the works. This documentation is to include:

- Contractors name and contact details.
- A complete list of subcontractors' names, addresses and telephone numbers noting which portions of the contract each provided.
- A complete list of equipment and appliances including serial numbers, manufacturers' names and sources of supply.
- Copies of all manufacturers' and suppliers' product literature containing maintenance requirements/instructions, for any products in the building work.
- Information for operation and maintenance as required
- Operation and maintenance manuals as required
- Maintenance contract proposals as required
- Final as built documents.
- Originals of all warranties and guarantees properly executed.
- Other information listed or referred to in this general section.
- Operation and maintenance information required by other project documents.

4.14.2 SELECTIONS INFORMATION

Provide details of actual selections used in the construction of the works. Include brochures and other information included with the items supplied.

4.14.3 O&M DOCUMENTATION FORMAT

Unless otherwise specified in a work section,

- Provide O&M drawings at scales appropriate to the detail to enable good legibility.
- Provide manufacturers documentation at the original scale.
- Provide written text generally in A4 format using a font not less than 10 point.

Submit O&M documentation in both hard copy and as electronic portable document format (PDF) files.

4.14.4 O&M DOCUMENTATION SUBMISSION & REVIEW

Unless otherwise specified in a work section, provide draft O&M documentation no later than the date of practical completion or the date on which the principal takes occupation of the works, whichever occurs first.

Submit O&M documentation to the named reviewer for review.

- Where no time is stated in a specific section, allow 10 working days for review by the reviewer. Where a large amount of documentation is involved more time will be necessary.
- Where no person is named in a specific section as the reviewer, submit the O&M documents to the contract administrator.
- Submit a proposed index system (as required for final documentation) to the contract administrator for review.

O&M review indicates only that the reviewer is satisfied that the documents are legible. The review is not a check of the accuracy of the documents, however the reviewer may comment on any aspect of the documentation and require the documents to be revised and resubmitted. Review of operation and maintenance documentation does not relieve the contractor of responsibility for the correctness of the documentation.

The reviewer may advise that:

- The O&M documentation has been reviewed and has been accepted without the need for further modification. The information can be included in the final documentation; or
- The O&M documentation has been reviewed and the information can be included in the final documentation subject to revision required by notes, annotations or comments provided; or
- The O&M documentation has been reviewed and is not acceptable, refer to notes, annotations or comments provided. Resubmit corrected/altered documentation for review.

Amalgamate the reviewed accepted and corrected O&M documentation into the final O&M documentation

4.14.5 SUBMISSION OF FINAL DOCUMENTATION

Prior to the end of the defects notification/liability period, provide complete O&M documentation in both hardcopy and electronic form.

4.15 QUALITY MANAGEMENT

The Quality Management Plan defines the acceptable level of quality, and describes how the project will ensure this level of quality in its deliverables and work processes.

Provide quality management plan to ensure the required level of quality is achieved.

4.16 HEALTH AND SAFETY MANAGEMENT

4.16.1 HEALTH AND SAFETY LEGISLATION

Refer to the requirements of the Health and Safety at Work Act 2015. Comply also with all other relevant New Zealand safety legislation.

The Contractor will ensure, so far as is reasonably practicable, that, each subcontractor they engage, each separate contractor named in the contract documents in relation to the Contract Works, is aware of and complies with its obligations under health and safety-related law.

For the purpose of health and safety-related law, the Contract Administrator and others involved in contract administration and observation and construction monitoring will not at any time have management or control of the Workplace.

4.17 WASTE MANAGEMENT ELECTRICAL

- Select electrical materials with a high recycled content.
- Ensure that reusable packaging materials are returned to the vendors.
- Separate and recycle metals and wire.
- Separate and recycle plastics.

4.14.6 FINAL O&M DOCUMENTATION - HARDCOPY

Provide the hard copy version of the O&M documentation in a loose-leaf binder with a contents index identifying operation and maintenance documents, requirements, manuals, operating instructions and selections. In addition, include the project name, contractor's name and the date of practical completion on the index page.

Include indexed sections to identify all operation and maintenance manuals that are not contained within the binder. Provide a copy of the front cover or other identifying feature of the manual within the section with a note stating "this manual has been provided separately".

Provide a title on the binder edge "Operation and maintenance instructions for (project name)". If more than one binder is required identify each binder by number and ranking (e.g. Volume 2 of 3) and group information logically between the binders for ease of reference.

Provide operation and maintenance manuals clearly and neatly marked on the spine or front cover so as to identify the project name. Where operation and maintenance manuals are a collection of loose leaf documentation, provide documentation in a loose-leaf binder as described above.

4.14.7 FINAL O&M INFORMATION - ELECTRONIC COPY

Provide a copy of all hardcopy information in PDF format arranged in logical named folders. In addition, provide DWG files of documentation if available.

4.14.8 REVIEW OF FINAL DOCUMENTATION

The contract administrator may review the final documentation and require alteration and resubmission.

4.14.9 FINAL DOCUMENTATION - INFORMATION FOR OPERATION AND MAINTENANCE

Provide a complete electronic copy to the contract administrator.

Provide two hardcopy sets of completed O&M documentation to the contract administrator. At least one set is to contain all available original documentation. The contractor is to retain a third hardcopy set for their records.

Provide any documentation (including required original documentation) as required to the relevant territorial authority.

4.14.10 FINAL DOCUMENTATION - OPERATION AND MAINTENANCE MANUALS

Provide a complete electronic copy to the contract administrator.

Provide two hardcopy sets of completed maintenance manuals to the contract administrator. At least one set is to contain all available original documentation. The contractor is to retain a third hardcopy set for their records.

Provide any documentation (including required original documentation) as required to the relevant territorial authority.

4.14.11 MAINTENANCE CONTRACT PROPOSALS

Unless otherwise specified in a work section, provide maintenance contract proposals to the contract administrator no later than the date of Practical Completion. Provide in electronic and hardcopy form.

5 MATERIAL AND EQUIPMENT SPECIFICATIONS

5.1 GENERAL

This section relates to the wiring for electrical installations, including:

- power
- lighting
- complete with componentry
- electrically-powered fittings

5.1.1 ABBREVIATIONS AND DEFINITIONS

The following abbreviations apply specifically to this section:

CFL	compact fluorescent lamp
ELV	extra low voltage
GLS	general lighting service
IP	international (ingress) protection classification
LCD	liquid crystal display
LED	light emitting diode
MCB	miniature circuit breaker
NUO	Network Utility Operator
PCB	printed circuit board
PIR	passive infrared
RCBO	residual current-operated circuit breaker with over current protection
RCCB	residual current-operated circuit breakers
RCD	residual current device
TPS	tough plastic sheathed
TCF	Telecommunications Carriers' Forum

5.1.2 MAINS AND SUBMAINS SUPPLY, SINGLE PHASE OR 3 PHASE

Mains and submains cabling shall be cross-linked polyethylene sheathed cable with aluminium or copper conductors to AS/NZS 4961 or AS/NZS 4206.

All cabling supplied shall be from manufacturers such as Nexans Olex, Prysmian, Triangle Cables, Tycab or equal and approved.

Underground mains shall be installed to the NUO requirements. Excavate trench, install cable and marker tape and backfill.

5.1.3 HEAVY DUTY RIGID PVC CONDUIT

Underground wiring to AS/NZS 2053.2, with corrosion proof fittings and accessories, brand matched to the conduit manufacturer's requirements.

All heavy duty rigid pvc conduits supplied shall be Marley, Iplex branded or equal and approved.

5.1.4 RIGID PVC CONDUIT

High impact, cold setting medium duty to AS/NZS 2053.2, jointed together and to fittings with solvent cement to the conduit manufacturer's requirements. Fittings and accessories brand matched to the conduit manufacturer's requirements.

All rigid PVC conduits supplied shall be Marley, Iplex branded or equal and approved.

5.1.5 SUBCIRCUITS CABLES

Cross-linked polyethylene sheathed cable with copper conductors to AS/NZS 5000.1 or cross-linked polyethylene sheathed neutral screened cable to AS/NZS 4961.

All cables supplied shall be Nexans Olex, Prysmian, Triangle Cables or Tycab branded or equal and approved.

5.1.6 SWITCH UNITS

All switch units supplied shall be PDL, Clipsal, HPM, Legrand, Hager or Vynco branded or equal and approved.

5.1.7 SWITCHED SOCKET UNITS

10 amp, 230 volt flat 3 pin socket outlets fitted with safety shutters and manufactured to AS/NZS 3100, AS/NZS 3112 and AS/NZS 3113, single or multi gang.

All switched socket outlets switches supplied shall be PDL, Clipsal, HPM, Legrand, Hager or Vynco branded or equal and approved.

5.1.8 LIGHT FITTINGS

As specified in drawings. Confirm any changes with Engineer and Architect.

5.1.9 OUTDOOR SWITCHES & SOCKETS

Using materials with superior UV protection, impact strength, and addition chemical resistance when compared with interior polycarbonate fittings. Weather protected, switches to IP56 minimum, and sockets to IP53 minimum. Sockets fitted with safety shutters behind socket pins, and all products able to be padlocked off or on.

All outdoor switches and sockets supplied shall be PDL, Clipsal, HPM, Legrand, Hager or Vynco branded or equal and approved.

5.1.10 SWITCHBOARD

Fit to AS/NZS 3000 and board manufacturer's requirements. Surface or floor mount plumb and level, with seismic restraints to NZS 4219. Ensure ingress protection and fire containment properties of the enclosure are maintained.

All switchboards supplied shall be commercial type of metal construction and to the engineers approval.

5.1.11 CIRCUIT PROTECTION

Install MCBs at switchboard to AS/NZS3000 to protect each final sub circuit.

All circuit protection supplied shall be Schneider, Teraski, GE, Hager or Eaton branded or equal and approved.

5.1.12 EARTH BONDS

Earth bonds to AS/NZS 3000, the Electricity (Safety) Regulations 2010 and the fitting manufacturer's requirements.

5.1.13 MAIN EARTH

Main earth to AS/NZS 3000, the Electricity (Safety) Regulations 2010 and the fitting manufacturer's requirements.

5.1.14 EARTH LEAKAGE PROTECTION

Install RCD protection to AS/NZS 3000.

All earth leakage detection devices supplied shall be Schneider, Teraski, GE, Hager or Eaton branded or equal and approved.

Where earth leakage protection is provided integral in a socket outlet the device shall be PDL, Clipsal, HPM, Legrand, Hager or Vynco branded or equal and approved.

5.1.15 SET-OUT

The position of outlets and equipment shown on drawings is indicative of requirements. Confirm documents and site conditions are not in conflict with other services or features. Resolve conflicts and discrepancies before proceeding with work affected. Confirm on site the exact location, disposition and mounting heights of all lights, outlets, equipment etc. Fix outlet items level, plumb and in line.

5.1.16 CABLING

Install wiring systems to AS/NZS 3000. All cabling runs concealed. Install cable in conduits where required to pass through concrete or where run underground.

5.1.17 CABLING CIRCUITS

Circuiting as detailed on drawings.

5.1.18 PERMANENTLY CONNECTED EQUIPMENT

Supply and set into position. Install an isolating switch of the correct current rating, and appropriate IP rating, type surface mounted to suit the location, with conductors between conduit and equipment enclosed in conduit.

5.1.19 ISOLATING SWITCHES

Locate isolating switches in positions as detailed on drawings.

5.1.20 LIGHT FITTINGS

Install light fittings in locations and at heights detailed and confirmed by the architect, in accordance with the fitting manufacturer's requirements. Fix fittings as per manufacturers instructions.

5.1.21 EXTRA LOW VOLTAGE LIGHTING

Use electronic drivers for LED lamps. Locate to manufacturer's requirements and as close as practicable to the light.

5.1.22 SURGE PROTECTION

Protection for the appliances with IEC 61643 Class II surge protection devices fitted to the switchboard. Install surge protection devices to manufacturer's requirements and in accordance with AS/NZS 3000 and AS/NZS 1768. When fitting IEC 61643 Class II protection at the switchboard, protect the device by dedicated circuit protection.

5.1.23 OUTDOOR/EXTERIOR SERVICES

Install all wiring systems in accordance with AS/NZS 3000 and in accordance with the manufacturer's recommendations:

Provide circuits and connections for exterior installations. Where underground, ensure appropriate protection, such as thickness of sheathing, conduit, depth of cabling, and proximity to other services.

Use the appropriate rated fittings for power control and power supply. Weather protected switches to IP56 and sockets to IP53 as a minimum. Install to manufacturer's specifications using recommended fittings and sealants to maintain the products integrity.

Earth leakage protection to be provided for exterior socket outlets.

5.2 PRIMARY POWER SUPPLY

This electrical section relates to the supply, fixing and testing of a LV power supply to the building main switchgear panel.

5.2.1 ELECTRICAL SUPPLY

Electrical supply shall be via a multiple-phase MEN system with a nominal voltage of 230 volts AC between phase and neutral and 400 volts AC between live conductors.

5.2.2 MAINS

Supply details of busbars, fixings, studs and clearance required for the termination and connection of mains to equipment and switchboards. Verify cable sizes for mains to equipment and systems before ordering. Confirm the proposed loadings and the adequacy of those mains.

5.2.3 EXECUTION

Carry out work to NZBC G9/VM1, AS/NZS 3000 and relevant Electrical Codes of Practice and all applicable Standards.

5.2.4 CABLE MARKERS

Install warning plates above underground wiring routes where cable passes through the external walls of the building.

Type test data:	Submit type test certificates for components, functional units and assemblies. Verify that type tests and internal arcing-fault tests, if any, were carried out at not less than the designated fault currents at rated operational voltage.
Alterations to TTAs:	Submit records of alterations made to assemblies since the tests.
Routine tests:	Submit reports.
Technical data:	Submit design calculations of non-type tested and non-proprietary busbar assemblies.

5.3.2 SWITCHBOARD COMPONENTS

To comply with the requirements of AS/NZS 3000.

Rated duty to be Uninterrupted.

Rated making capacity (peak) to be 2.1 x fault level (RMS) at assembly incoming terminals.

Utilisation category to AS/NZS IEC 60947.1 clause 4.4.

- Circuits consisting of motors or other highly inductive loads: At least AC-23.
- Other circuits: At least AC-22.

5.3.3 ROUTINE TESTS

Carry out routine tests to AS/NZS 3439.1. Electrical and mechanical routine function tests at the factory using externally connected simulated circuits and equipment and Dielectric testing, 2.5 kV r.m.s. for 15 s, give sufficient notice so inspection may be made with busbars exposed and functional units in place and ready for routine testing.

5.3.4 ENCLOSURE MATERIALS

Fabricate enclosures from rigid folded and/or welded construction 1.6mm thick metallic-coated sheet steel finish coats: Thermoset powder coating to AS 4506 or two-pack liquid coating of AS/NZS 3750.13 primer and proprietary or epoxy acrylic full gloss spray finish. Ventilation rated for full load, cover ventilation openings with non-combustible and corrosion resistant 1mm mesh. Equipment mounting panels to support the weight of mounted equipment, using 3mm thick metal with heavy metal angle supports or plates bolted or welded to enclosure sides.

5.3.5 SWITCH ISOLATOR AND COMBINATION FUSE-SWITCH UNITS

To AS/NZS IEC 60947.3:2015.

Independent manual operation including positive ON/OFF indicator with shrouding: Effective over range of switch positions.

Rated breaking capacity: rated full load current.

5.2.5 WIRING

Do not bend more than the minimum radius required by the cable manufacturer. Fix cables of essential services to the permanent structure above ducts, pipes and other elements that can be dislodged.

5.3 SWITCHBOARDS

This electrical section relates to the design, supply, fixing and testing of low voltage switchboards.

5.3.1 SHOP DRAWINGS

Supply drawings required for co-ordination of the work. Confirm overall dimensions. Design to fit the available space with clearances required by Standards.

Supply the name of the switchboard manufacturer, details of any changes to the original design, documented confirmation that the switchboard will give a short circuit rating of a minimum of the value specified, or as advised by the NUO, whichever is greater, and the sizes and brand names of all boxes and cabinets.

Submit shop drawings showing:

- Description of materials and finishes
- Internal wiring and ratings
- Clearances between live parts and live parts and earth
- Wiring diagrams and schematics of instrument protection and control circuits
- The weight of switchboards over 500kg.
- Types, model numbers and ratings of assemblies
- Component details, functional units and transient protection
- Detailed dimensions
- General arrangement, plan view, front elevations and cross-section of each compartment shipping section.
- Projections from the assembly that may affect clearances or inadvertent operation, such as handles, knobs, arcing-fault venting flaps and withdrawable components
- Fault level and rated short circuit capacity characteristics
- IP rating
- Fixing details for floor or wall mounting
- Front and back equipment connections and top and bottom cable entries
- Door swings
- External and internal paint colours and paint systems
- Quantity, brand name, type and rating of control and protection equipment
- Construction and plinth details, ventilation openings, internal arcing-fault venting and gland plate details
- Terminal block layouts and control circuit identification
- Single line power and circuit diagrams
- Details of mains and submain routes within assemblies
- Busbar arrangements, links and supports, spacing between busbar phases and spacing between assemblies, the enclosure and other equipment and clearances to earthed metals
- Dimensions of busbars and interconnecting cables
- Form of separation and details of shrouding of terminals
- Labels and engraving schedules, a size and wording
- Supply protection settings and protection study to confirm full discrimination of the installation.

IEC 61643 class II surge protection devices fitted to distribution boards not able to withstand transient overvoltage's exceeding class 1 protection let-through residual levels.

All surge protection devices shall be Schneider, Eaton or Dehn branded or equal and approved.

5.3.11 CONTACTORS

To AS/NZS IEC 60947.4.1.

Enclosed, block type, air break, electro-magnetic, 3 pole.

Rated operational current greater than full load current of the load controlled, 16 A with auxiliary contacts one normally-open and one normally-closed. Mount with clearance to allow access for maintenance, removal and replacement of coils and contacts, without the need to disconnect wiring or remove other equipment.

All contactors shall be Schneider, Teraski, GE, Hager, Omron or Eaton branded or equal and approved.

5.3.12 ROTARY SWITCHES

Cam operated type with switch positions arranged with displacement of 60°, locate off position at the 12 o'clock position. Test positions must spring return to off position. 6 Amp at 230 V a.c, with rectangular escutcheon plate. Identify switch position and function.

5.3.13 TIME SWITCHES

To incorporate the following features:

- quartz crystal time base
- day and week digital with hour and minute display
- day omitting device, 365-day operation
- 24 hours minimum battery-operated reserve
- manual on/auto/off over-riding switch
- ± 1 hour capability for summer/winter time change, switch operated
- automatic adjustments for daylight saving

5.3.14 CURRENT TRANSFORMERS

Those for the network utility operator equipment to be supplied by the electricity retailer or metering company. Those for other usages to comply with AS 60044.1 and be class 0.5M for energy metering and class 5P for protection.

5.3.15 PUSH BUTTONS

Oil-tight, minimum 22mm diameter, or 22 x 22mm rated operational current: At least 4 A at 240 V a.c, emergency stop devices with mechanical latching: To AS/NZS IEC 60947.5.5. Identify functions of each push-button. For latched STOP or EMERGENCY STOP pushbuttons, provide label with instructions for releasing latches.

5.3.16 BUSBARS

To AS/NZS 3439.1, high conductivity hard drawn tinned copper bar with arrised edges, sufficient to supply the capacity of the switchboard when filled, with neutral bus bars of the same current rating and size as phases and joints, terminations and fixings accessible. Arrange to safely withstand possible maximum prospective

All switch isolator and combination fuse-switch units shall be Schneider, Teraski, GE, Hager or Eaton branded or equal and approved.

5.3.6 MOULDED CASE CIRCUIT BREAKERS

To AS/NZS IEC 60947.2 and AS 2184.

Independent manual operation including positive ON/OFF indicator. Adjustable thermal, fixed magnetic or electronic trip unit, current limiting and isolation facility. Mount circuit breakers so that the ON/OFF and current rating indications are clearly visible with covers or escutcheons in position. Align operating toggles of each circuit breaker in the same plane.

All moulded case circuit breakers shall be Schneider, Teraski, GE, Hager or Eaton branded or equal and approved.

5.3.7 RESIDUAL CURRENT OPERATED CIRCUIT BREAKERS

To AS/NZS 3190, integral non-overload protection type: to AS/NZS 61008.1, Integral overload protection type: To AS/NZS 61009.1, Modular type: To AS/NZS IEC 60947.2, default tripping current: 30 mA, Type A.

All residual current circuit breakers shall be Schneider, Teraski, GE, Hager or Eaton branded or equal and approved.

5.3.8 FUSE LINKS

To AS 60269.1, AS 60269.2.0 and AS 60269.2.1.

Enclosed, high rupturing capacity type mounted in a fuse carrier, breaking range and utilisation category:

- Distribution/general purpose: gG
- Motors: gM

Provide 3 spare cartridges of each type and rating used, including fault current limiting fuses, in a labelled panel adjacent to the main switchboard.

5.3.9 FUSE CARRIERS AND BASES

To AS/NZS IEC 60947.3:2015 and AS 60269.1

Mount fuse-carriers so that fuse carriers may be withdrawn directly towards the operator and away from live parts. Provide fixed insulation which shrouds live metal when the fuse carrier is withdrawn. Provide barriers on both sides of each fuse link, preventing inadvertent electrical contact between phases by the insertion of screwdriver.

All fuse carriers and bases shall be Cooper Bussmann, IPD, Schneider or Legrand branded or equal and approved.

5.3.10 SURGE PROTECTION

IEC 61643 class I surge protection devices fitted to main switch board, with visual indication of status of transient detection and one set of normally closed 'dry' contacts indicating occurrence of a surge transient and level of protection remaining.

fault currents. Support on synthetic resin moulded type insulators, panels and cleats. Fully lap joints, finished electro-tinned, coated with acid free petroleum jelly and bolted together with high tensile cadmium plated steel bolts, washers, nuts and lock-nuts.

5.3.17 NEUTRAL AND EARTH BARS

To AS/NZS 3000 and AS/NZS 3439.1. Brass and or copper bar with tunnel type terminals for cables up to 6mm² and stud type cable lugs for others.

5.3.18 MINIATURE CIRCUIT BREAKERS

To AS/NZS 60898.1 and AS/NZS IEC 60947.2. Fixed thermal magnetic type, minimum 6kA rated.

All miniature circuit breakers shall be Schneider, Teraski, GE, Hager or Eaton branded or equal and approved.

5.3.19 AIR CIRCUIT BREAKERS

To AS/NZS IEC 60947.1. Fixed type with mechanical ON/OFF indication, rated 50kA for 1 second (minimum). Closing mechanism spring operated, manual and motorised.

All air circuit breakers shall be Schneider, Teraski, GE, Hager or Eaton branded or equal and approved.

5.3.20 SWITCHES AND ISOLATORS

To AS/NZS IEC 60947.4.2.

5.3.21 AUXILIARY AND CONTROL SWITCHES

To AS/NZS IEC 60947.3.2015.

5.3.22 INDICATOR LIGHTS

To AS 3947, panel mounted 22mm diameter.

5.3.23 CONTROL RELAYS

Solid state electronic type time delay relays, continuously rated at 10 amps to AS/NZS IEC 60947.5.1, with silver contacts, surge suppression on coils and have 1 spare set of normally open and normally closed contacts.

5.3.24 PLUG IN RELAYS

Continuously rated at 10 amps, with silver contacts non-welding and surge suppression on coils with 11 pin circular contact configuration and LED indication of coil activation. Use spring clip retainers when mounted in a horizontal plane. Include adjustable time delay if required.

5.3.25 MATERIALS, FITTINGS AND EQUIPMENT

To the required standard, complying with the relevant Standards, Codes and Regulations.

5.3.26 INSTALLATION

To NZBC G9/VM1, AS/NZS 3000, AS/NZS 3008.1.2 and relevant Electrical Codes of Practice.

5.3.27 SETTING OUT

At the earliest opportunity set-out the position and sizes of holes, recesses and chases as necessary for the accommodation of the electrical services for the complete electrical installation. Arrange for those trades affected to carry out this work during construction or afterwards by cutting out and making good.

5.3.28 SWITCHBOARDS APPLICATION

Secure firmly plumb and level in position with masonry screws or bolts. Cut entry holes by machine saw or machine punching without distortion. Leave edges smooth, and neatly cover exposed metal with a matching anti-corrosive coating. Secure free-standing cubicle type switchboards on a supporting base of mild steel channel sections bolted rigidly in place. Apply seismic restraint measures to NZS 4219.

Mount all switchboard equipment on fixing rails or insulating panels within the cabinet, with only toggles, indicators, handles and dials protruding and all to enable easy access for adjustment, replacement and maintenance. Ensure any unit can be installed or can be replaced without disturbing adjacent units. Set out equipment on doors in a logical manner in function groups, accessible without use of key or tool.

5.3.29 SWITCHBOARD CONSTRUCTION

Provide fixings in the supporting structure and removable attachments for lifting. Provide mild steel channel plinth for floor mountings, galvanised to class Z600, with toe-out profile, nominal 75mm high x 40mm wide x 6mm thick, for mounting complete assemblies on site. Drill M12 clearance holes in assembly and channel and bolt assemblies to channel.

5.3.30 CABLE ENTRIES

Provide cable entry facilities for incoming and outgoing power and control cabling, to allow cables to be neatly run and terminated, without undue bunching and sharp bends.

5.3.31 COVER AND GLAND PLATES

Provide removable aluminium gland plates fitted with gaskets to maintain the degree of protection.

5.3.32 DOORS AND COVERS

Maximum door width 600mm. At least 90° swing, comply with AS/NZS 3000 clearance requirements. Fit suitable resilient sealing rubber to provide the required IP rating. Hinges: Provide corrosion-resistant pintle hinges or integrally constructed hinges to support doors.

Corrosion resistant lever-type handles, with latching bar and guide strong enough to withstand explosive force resulting from fault conditions within the assembly.

Lockable doors, key alike, 2 keys per assembly.

5.3.33 DOOR MOUNTED EQUIPMENT

Protect or shroud door mounted equipment and terminals to prevent inadvertent contact with live terminals, wiring, or both.

Maintain earth continuity to door mounted indicating or control equipment with multistranded, flexible earth wire, bonded to the door.

5.3.42 MARKING CABLES

Identify the origin of all wiring by means of legible indelible marking. Provide durable labels fitted to each core and sheath, permanently marked with numbers, letters or both to suit the connection diagrams. Identify multicore cables and trefoil groups at each end with durable non-ferrous tags clipped around each cable or trefoil group.

5.3.43 MAIN SWITCHBOARD AT COMPLETION

At completion tighten busbar joints, cable terminations and connections. Vacuum clean dust and debris from the interior and wipe down and polish exterior surfaces.

5.3.44 MARKING AND LABELLING

Label the switchboard assembly in conformance with AS/NZS 3439.1 including the size and type of all incoming and outgoing mains and submains.

- Lettering heights: Include the following requirements:
  - Isolating switches: ≥ 5mm.
  - Switchboards, main assembly designation: ≥ 25mm.
  - Switchboards, outgoing functional units: ≥ 8mm.
  - Switchboards, sub assembly designations: ≥ 15mm

5.3.45 DANGER, WARNING AND CAUTION NOTICES

Provide warning notices on the front cover near the main switch or local main switch and on rear covers, indicating live busbars.

To prevent accidental contact with live parts, provide warning notices for equipment on assemblies not isolated by main switch or local main switch. Provide warning notices stating that assemblies may be energised from the stand-by supply at any time if applicable.

5.3.46 LEAVE CLEAN

Leave systems and equipment for the complete electrical installation operating correctly and to the Electricity (Safety) Regulations 2010 and the NUO. Leave work including light fittings, switch and socket plates, switchboards and distribution boards clean, undamaged, in full working order and to the standard required.

5.4 POWER DISTRIBUTION

5.4.1 CABLE PITS

Cable draw pits sized by the Electrical Contractor to suit number of ducts detailed. Provide proprietary concrete/polymer moulded pits with riser modules as required for ducting and conduit depth.

Pit covers to suit external loads minimum Class B, flush with the top of the pit to AS 3996.

5.4.2 STEEL CONDUIT

To AS/NZS 2053.7, hot-dip galvanized to AS/NZS 4680, for damp or exterior situations and complete with fittings and accessories brand matched as required by the conduit manufacturer.

5.3.34 ESCUTCHEONS

Doors enclosing circuit breakers, fitted with escutcheon plates as barriers between operating mechanisms and live parts.

5.3.35 ESCUTCHEON PLATES

Provide plates or removable covers with neat circuit breaker toggle cut-outs allowing interchange ability of 1, 2 and 3 pole circuit breakers. Provide corrosion-resistant lifting handles or knobs. Provide unused circuit breaker toggle cut-outs with blanking in-fill pole covers.

5.3.36 BUSBARS

Support material: Non-hygroscopic insulation capable of holding busbars at 105°C.

Multi-pole proprietary insulated busbar assemblies or busbar systems, verified for short circuit capacity and temperature rise-limits by type tests.

5.3.37 BUSBARS LINKS

Bolted removable busbar links stamped MEN LINK, located in the incoming compartment, between neutral and earth busbars. For current transformers, provide removable busbar links 250mm long. Pre-drill the main circuit supply busbar for future extensions and extend busbar droppers into future functional unit locations.

5.3.38 TERMINALS

Provide neutral links and earth bars at the top and bottom of the circuit breaker section with terminals for future circuits. Mount neutral links on an insulated base.

5.3.39 INTERNAL WIRING

0.6/1 kV copper cables with V-90HT insulation where directly connected to active and neutral busbars. Identify power and control cables at both ends with neat fitting ring type ferrules agreeing with record circuit diagrams. Mark to AS/NZS 4383. Terminate control cables and motor control circuits in tunnel terminals or, if necessary, provide suitable palm type lugs and correct crimp tool. Provide slotted trunking.

5.3.40 CIRCUIT CHARTS

For general light and power distribution assemblies, provide circuit charts of minimum size 200 x 150mm, with type written text showing the following as-installed information:

- Submain designation, rating and short-circuit protective device.
- Light and power circuit numbers and circuit breaker current ratings, cable sizes and type and areas supplied.
- Mounting: Mount schedule cards in a holder fixed to the inside of distribution board Protect with hard plastic transparent covers.

5.3.41 SINGLE LINE DIAGRAMS

Main and submain assemblies: Provide single-line diagrams.

Format: Non-fading print, at least A3 size, showing the situation as installed.

Mounting: Enclose in a non-reflective PVC frame and wall mount close to assembly.

5.4.3 HEAVY DUTY RIGID PVC CONDUIT

To AS/NZS 2053.2 for underground wiring, jointed together and to fittings with solvent cement to the conduit manufacturers requirements. Fittings and accessories brand matched as recommended by the conduit manufacturer.

All heavy duty rigid pvc conduits supplied shall be Marley or Iplex branded or equal and approved.

5.4.4 RIGID PVC CONDUIT

To AS/NZS 2053.2, high impact, cold setting light or medium duty complying with, jointed together, to fittings with solvent cement to the conduit manufacturer's requirements. Fittings and accessories brand matched, as recommended by the conduit manufacturer.

All rigid pvc conduits supplied shall be Marley or Iplex branded or equal and approved.

5.4.5 FLEXIBLE CONDUIT

To AS/NZS 2053.1 and AS/NZS 2053.4 for PVC, also AS/NZS 2053.8 for rust proofed steel sheathed with PVC. Securely terminated in purpose made fittings when connected to equipment enclosures and maintaining the degree of protection of the enclosure. Minimum degree of protection IP54 to AS1939.

All flexible conduits supplied shall be Marley or Iplex branded or equal and approved.

5.4.6 MAINS AND SUB-MAINS

As shown on the single line diagram and installed over routes, without joints, that have been fully co-ordinated with other services but generally following the basic routes shown on the drawings.

Confirm details of busbars, fixings, studs and clearance required for the termination and connection of sub-mains to equipment and switchboards. Cable sizes for sub-mains to equipment and systems to be verified with the installer before ordering. Confirm the proposed loadings and the adequacy the sub-mains.

All mains and sub-mains cables supplied shall be Nexans Olex, Prysmian, Triangle Cables or Tycab branded or equal and approved.

5.4.7 CABLES

Stranded copper conductors, minimum size of 2.5mm² and insulation coloured as follows:

- Red: Active of single phase circuits
- Black: Neutral of single phase circuits

Actives of multi-phase circuits:

- Red: A phase
- White: B phase
- Blue: C phase
- Black: Neutrals of multi-phase circuits
- Switch wires: As required but matching for similar functions
- Control wires: As required but matching for similar functions
- Green/yellow: Earth wires:

All cables supplied shall be Nexans Olex, Prysmian, Triangle Cables or Tycab branded or equal and approved.

5.4.8 NEUTRAL SCREEN CABLES

To AS/NZS 5000.1, insulated with 0.6/1 kV grade PVC or XLPE compound.

All neutral screen cables supplied shall be Nexans Olex, Prysmian, Triangle Cables or Tycab branded or equal and approved.

5.4.9 TPS CABLES

To AS/NZS 5000.1, insulated with 0.6/1 kV grade PVC compound or higher.

All TPS cables supplied shall be Nexans Olex, Prysmian, Triangle Cables or Tycab branded or equal and approved.

5.4.10 FLEXIBLE CORDS

To AS/NZS 3191, PVC insulated and PVC sheathed.

5.4.11 XLPE CABLES

To AS/NZS 1660.2.2, XLPE insulated with 0.6/1 kV grade compound.

All XLPE cables supplied shall be Nexans Olex, Prysmian, Triangle Cables or Tycab branded or equal and approved.

5.4.12 CABLE TERMINATION LUGS

Other than small accessories and luminaire terminals, use compression type lugs, sized and fitted in accordance with the manufacturer's requirements.

5.4.13 TEE OFF BOXES

Tee off boxes for connection of sub-mains where shown to switchboard standard, fitted with fuses, links or circuit breakers as required, completely accessible from the front and sealable by the network utility operator where part of unmetered mains.

5.4.14 CONTACTORS

To AS/NZS IEC 60947.4.1 or AS/NZS IEC 60947.4.2, rated to utilisation category in AS/NZS 3947.4.3.

All contactors shall be Schneider, Teraski, GE, Hager, Omron or Eaton branded or equal and approved.

5.4.15 LIGHT SENSITIVE SWITCHES

Weatherproof plug-in sensor head and receptacle base type suitable for switching the controlled lighting systems. Incorporate a time delay to prevent operation during transient lighting conditions, and shield to avoid other artificial lighting sources operation.

5.4.16 POWER OUTLETS

Single phase 10A or 15A, 230V mechanisms as required, rocker operation with 3-pin (flat earth pin) plug base mounted under a moulded polycarbonate flush plate and with 2 switches and plug bases in a standard flush plate for double socket outlets. Install industrial IP56 type in exterior areas. To AS/NZS 3000 for outlets in damp or exterior situations.

Three phase outlets press or rotary switch operated with 5-pin screw-neck plug socket, spring loaded flap and flush mounted in a polycarbonate enclosure. Provide ratings as shown, to suit equipment or 20 amps, whichever is the greater.

Damp area and exterior outlets to be RCD protected (30 mA), to AS/NZS3190.

All power outlets supplied shall be PDL, Clipsal, HPM, Legrand, Hager or Vynco branded or equal and approved.

5.4.17 PROSPECTIVE FAULT LEVEL

Confirm fault current level at consumer's point of connection with the NUO.

5.4.18 EARTHING

Electrical system earthing to the Electricity (Safety) Regulations 2010, AS/NZS 3000, Electrical Codes of Practice and the NUO's requirements.

5.4.19 POWER FOR TESTING

Arrange to suit the building programme and apply for the connection of permanent full power before completion. Connect for testing sub-mains, controls and associated items of equipment and systems installed by others. Do not connect lighting and power outlets for general usage before completion.

5.4.20 EXCAVATION

Excavate for underground wiring straight from point to point without joints, of uniform grade, carrying out safety procedures as required by WorkSafe NZ, Good Practice Guidelines - Excavation Safety, and keeping clear of falling material and water. Backfill with excavated material, firmly compacted in 200mm layers. Use clean sand for bedding and avoid sharp materials in backfill. Use a 2 stage process for backfilling, placing plastic warning tape and any protection required by Standards in between backfill layers.

5.4.21 CABLE MARKERS

Install warning plates above underground wiring routes where cable passes through the external walls of the building.

Install warning plates at external distribution cabinets to indicate the presence of underground electrical cabling.

5.4.22 FLEXIBLE CONDUIT

Provide between fixed conduit and equipment subject to movement or vibration with brass or nylon terminators, using a flush mounted junction box with the terminator secured by locknuts to the cover plate.

5.4.23 CIRCUITING

Provide separate circuits for lighting and power. Individual lighting circuit load not to exceed 8 Amps single phase unless otherwise specified.

5.4.24 DE-RATING

Conductor sizes specified are minimum sizes. Install cables in size, grouping, spacing, enclosure and locations so that the current rating of conductors as permitted by the Electricity (Safety) Regulations 2010 and AS/NZS

3008.1.2 (after the appropriate de-rating factors have been applied) is not less than the specified current rating of the circuit breaker/fuse protecting the conductor. If the de-rated current rating is less than that specified increase the size of the conductor accordingly.

5.5 METERING

5.5.1 METERS

Industrial grade instantaneous meters with shock resistant jewel bearings. Kilowatt hours meters to AS 1284.1. Tariff meters used for collecting revenue to be Electricity Governance Rules (EGR) compliant and to IEC 61036. Provide digital power meter with amp, volts, power factor, kW, kVar, kVA and maximum demand per phase.

5.5.2 INSTALLATION

Arrange for the electricity retailer or metering company to supply and install their metering equipment to their requirements. Provide required fixings, panels, wiring links and hardware necessary. Pay associated charges. Select the tariff rate most advantageous to the consumer.

5.6 LIGHTING

This section relates to the supply, fixing and testing of all luminaires/light fittings and lamps as shown on the drawings, or otherwise specified or scheduled.

5.6.1 ABBREVIATIONS

The following abbreviations are used throughout this part of the specification:

- CCT corrected colour temperature
- CFL Compact fluorescent lamp
- CRI colour rendering index
- DALI digital addressable lighting interface
- EEI energy efficiency index
- ELV extra low voltage
- LED light emitting diode

5.6.2 LED TESTS

Lighting efficacy: Confirm the efficacy of the following by a photometric test, carried out for the applicable CCT, from an independent approved laboratory:

- Light-emitting diode luminaires.
- Light-emitting diode lamp replacement modules

5.6.3 LIGHT-EMITTING DIODE (LED) LUMINAIRES

Integral/non-integral LEDs, reflectors, lenses, heatsinks and drivers.

LED luminous efficacy of the LED luminaire at normal operating temperature in its normal position and enclosure of > 60 lumens per watt.

Project : Rotorua Lakefront
Reference : 518-037

Issue : Tender
Revision : 1

SEG

Distribution Board Schedule

DB Board Name:	DB 1A
DB Supplied From:	Integral to DB A
Supply Cable:	Integral to DB A
Voltage:	400V
No. of Phases:	3
Construction Form:	2b
Current Rating:	100A
Isolator Rating:	100A
Fault Rating:	15kA/0.1s
Surge Arrestor:	Type 2 40kA (8/20)
Enclosure:	Cast aluminium cabinet (Montrose style) powder coated Green
Ingress Protection:	IP54
Energy Retailers Meter :	Integral to DB A
Mounting Type:	Plinth Mounted

Notes:
Distribution board mounted inside cast aluminium cabinet
Provide locks to enclosure doors, keyed to the RLC Lakefront Master Key.
Provide galvanised steel tube protective barrier around cabinet
Provide additional cabinet as part of distribution board to house lighting controls as required.
Provide galvanised steel earth electrodes to AS/NZ 3000
Refer electrical schematic drawings for further details.

Circuit Reference	Circuit Breaker	Trip Curve	RCD	Relay / Contactor	Ripple Relay	Timeclock channel	Auto/Manual/Off	Minimum Cable Size	Conductor Type	Cable Type	Circuit Description
R1	16	C	No	C1-1	RR1	TC1	ADM S1	6mm2	Cu	2C+E Circular XLPE	Boardwalk Strip & Tukutuku Spot Lighting
W1	16	C	No	C1-2				6mm2	Cu	2C+E Circular XLPE	Boardwalk Strip & Tukutuku Spot Lighting
B1	16	C	No	C1-3				6mm2	Cu	2C+E Circular XLPE	Boardwalk Strip Lighting
R2	16	C	No	C1-4				6mm2	Cu	2C+E Circular XLPE	Boardwalk Strip & Tukutuku Spot Lighting
W2	16	C	No	C2-1				6mm2	Cu	2C+E Circular XLPE	Boardwalk Strip & Tukutuku Spot Lighting
B2	16	C	No	C2-2				6mm2	Cu	2C+E Circular XLPE	Boardwalk Strip & Tukutuku Spot Lighting
R3											
W3	63	63	No					70mm2	Al	4C Circular XLPE	Boardwalk Power Outlet Pillar
B3											
R4											
W4	10	C	No				Tstat	2.5mm2			Cabinet Heater
B4	10	C	No					1.5mm2			Lighting Controls Supply

Notes:
All miniature circuit breakers and residual current devices shall be 6kA rated minimum.
Provide cabinet heater and thermostat inside cast aluminium enclosure with thermostat set to 10 C°.
Lighting to be controlled via a street lighting ripple relay unit in combination with a digital multichannel weekly astro timeclock with battery backup and auto/manual/off switches controlling contactors

Colour:	CCT 3000K, CRI > 80
Life:	LED in the complete luminaire: L70 to IESNA LM-80-2008
Control gear:	To AS/NZS IEC 61347.2.13

5.6.4 LUMINAIRE FUSES

Luminaires with suitably rated fuse links to AS/NZS 60598.1 complete with carrier and base and spare fuse.

5.6.5 WIRING, FLEXIBLE CORD

1.0mm² 3-core V75 (minimum) PVC/PVC flexible cord, connected to a 10A 3-pin moulded plug to AS/NZS 3112.

5.6.6 INSTALLING LUMINAIRES

Install to the luminaire manufacturer's requirements in correct orientation for light output, complete with lamps, also suitable for location and application. Apply seismic restraint measures to NZS 4219. Use protective gloves when handling reflectors or lamps. Ensure transformers/drivers and rear of luminaires are adequately ventilated and clear of any building elements, to AS/NZS 3000.

5.6.7 INSTALLING EXTERIOR LUMINAIRES

Seal to maintain IP rating suitable for location and application. Seal all penetrations to maintain weather tightness.

5.6.8 FINAL CONNECTION

Take fixed wiring directly into fitting terminals, use heat resistant sleeves where subject to excessive heating. Where specified connect recessed luminaires to a plug/socket arrangement, if IP rated use flexible cord glanded into fitting to maintain IP rating

5.6.9 INSTALL LIGHTING CONTROL SYSTEM

To manufacturer's requirements. Locate in or adjacent to distribution boards. Control wiring to be 300mm clear of power wiring. Set timers or program, sensors and switches as specified.

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Reference : 518-037

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Distribution Board Schedule

DB Board Name:	DB 1B
DB Supplied From:	DB B
Supply Cable:	4C 120mm Aluminium XLPE
Voltage:	400V
No. of Phases:	3
Construction Form:	2b
Current Rating:	100A
Isolator Rating:	100A
Fault Rating:	16kA/0.1s
Surge Arrestor:	Type 2 40kA (8/20)
Enclosure:	Cast aluminium cabinet (Montrose style) powder coated Green
Ingress Protection:	IP54
Energy Retailers Meter :	No
Mounting Type:	Plinth Mounted

Notes:
Distribution board mounted inside cast aluminium cabinet. Cabinet to have cable flap at bottom for entry of extension leads without need leave cabinet doors open.
Provide locks to enclosure doors, keyed to the RLC Lakefront Master Key.
Provide galvanised steel tube protective barrier around cabinet.
Provide additional cabinet for the mounting of socket outlets, as detailed below to the face.
Provide additional cabinet as part of distribution board to house lighting controls as required.
Provide galvanised steel earth electrodes to AS/NZ 3000.
Refer electrical schematic drawings for further details.

Circuit Reference	Circuit Breaker	Trip Curve	RCD	Relay / Contactor	Ripple Relay	Timeclock channel	Auto/Manual/Off	Minimum Cable Size	Conductor Type	Cable Type	Circuit Description
R1	16	C	No	C1-1				6mm2	Cu	1C Neutral Screen XLPE	Pathway / Cycleway Pole Lighting
W1	16	C	No	C1-2				6mm2	Cu	1C Neutral Screen XLPE	Pathway / Cycleway Pole Lighting
B1	16	C	No	C1-3		TC1	ADM S1	6mm2	Cu	1C Neutral Screen XLPE	Pathway / Cycleway Pole Lighting
R2	16	C	No	C1-4				6mm2	Cu	1C Neutral Screen XLPE	Pathway / Cycleway Pole Lighting
W2	16	C	No	C2-1				6mm2	Cu	1C Neutral Screen XLPE	Pathway / Cycleway Pole Lighting
B2	16	C	No	C2-2				6mm2	Cu	1C Neutral Screen XLPE	Pathway / Cycleway Pole Lighting
R3	16	C	No	C3-1	RR1			6mm2	Cu	2C+E Circular XLPE	Boardwalk Strip Lighting
W3	16	C	No	C3-2			ADM S2	6mm2	Cu	2C+E Circular XLPE	Boardwalk Strip Lighting
B3	16	C	No	C3-3				6mm2	Cu	2C+E Circular XLPE	Pavilion Strip & Inground Lighting
R4	16	C	No	C4-1		TC2		6mm2	Cu	2C+E Circular XLPE	Boardwalk Strip Lighting
W4	16	C	No	C4-2			ADM S3	6mm2	Cu	2C+E Circular XLPE	Boardwalk Strip & Tukutuku Spot Lighting
B4	16	C	No	C4-3				6mm2	Cu	2C+E Circular XLPE	Boardwalk Strip & Tukutuku Spot Lighting
R5	16	C	No	C4-4				6mm2	Cu	2C+E Circular XLPE	Boardwalk Strip & Tukutuku Spot Lighting
W5	16	C	No					4mm2	Cu	2C+E Circular XLPE	CCTV Camera Power Supply
B5											
R6											
W6											
B6											
R7											
W7											
B7											
R8											
W8											
B8											
R9											
W9											
B9											
R10	20	C	30mA					2.5mm2	Cu		POL 695 socket outlet mounted to cabinet door
W10	16A	C	30mA					2.5mm2	Cu		POLBAL51217 socket outlet mounted to cabinet door
B10	16A	C	30mA					2.5mm2	Cu		POLBAL51217 socket outlet mounted to cabinet door
R11											
W11	32	C	30mA					6mm2	Cu		POL 56SD532 socket outlet mounted to cabinet door
B11											
R12	20	C	30mA					2.5mm2	Cu		POL 695 socket outlet mounted to cabinet door
W12	10	C	No				Tstat	2.5mm2	Cu		Cabinet Heater
B12	10	C	No					1.5mm2	Cu		Lighting Controls Supply

Notes:
All miniature circuit breakers and residual current devices shall be 6kA rated minimum.
Provide cabinet heater and thermostat inside cast aluminium enclosure with thermostat set to 10 C°.
Lighting to be controlled via a street lighting ripple relay unit in combination with a digital multichannel weekly astro timeclock with battery backup and auto/manual/off switches controlling contactors.

Project : Rotorua Lakefront
Reference : 518-037

Issue : Tender
Revision : 1

SEG

Distribution Board Schedule

DB Board Name:	DB 1A1
DB Supplied From:	DB 1A
Supply Cable:	4C 50mm Aluminium XLPE
Voltage:	400V
No. of Phases:	3
Construction Form:	2b
Current Rating:	100A
Isolator Rating:	100A
Fault Rating:	16kA/0.1s
Surge Arrestor:	Type 2 40kA (8/20)
Enclosure:	Cast aluminium cabinet (Montrose style) powder coated Green
Ingress Protection:	IP54
Energy Retailers Meter :	No
Mounting Type:	Plinth Mounted

Notes:
Distribution board mounted inside cast aluminium cabinet. Cabinet to have cable flap at bottom for entry of extension leads without need leave cabinet doors open.
Provide locks to enclosure doors, keyed to the RLC Lakefront Master Key.
Provide additional cabinet for the mounting of socket outlets, as detailed below to the face.
Provide galvanised steel tube protective barrier around cabinet.
Provide galvanised steel earth electrodes to AS/NZ 3000.
Refer electrical schematic drawings for further details.

Circuit Reference	Circuit Breaker	Trip Curve	RCD	Relay / Contactor	Ripple Relay	Timeclock channel	Auto/Manual/Off	Minimum Cable Size	Conductor Type	Cable Type	Circuit Description
R1	20	C	30mA					2.5mm2	Cu		POL 695 socket outlet mounted to cabinet door
W1	16A	C	30mA					2.5mm2	Cu		POLBAL51217 socket outlet mounted to cabinet door
B1	16A	C	30mA					2.5mm2	Cu		POLBAL51217 socket outlet mounted to cabinet door
R2											
W2	32	C	30mA					6mm2	Cu		POL 56SD532 socket outlet mounted to cabinet door
B2											
R3	20	C	30mA					2.5mm2	Cu		POL 695 socket outlet mounted to cabinet door
W3											
B3											
R4											
W4											
B4	10	C	No				Tstat	2.5mm2			Cabinet Heater

Notes:
All miniature circuit breakers and residual current devices shall be 6kA rated minimum.
Provide cabinet heater and thermostat inside cast aluminium enclosure with thermostat set to 10 C°.