

Acton Tunnel Lighting Upgrade

TAMS

25 June 2010

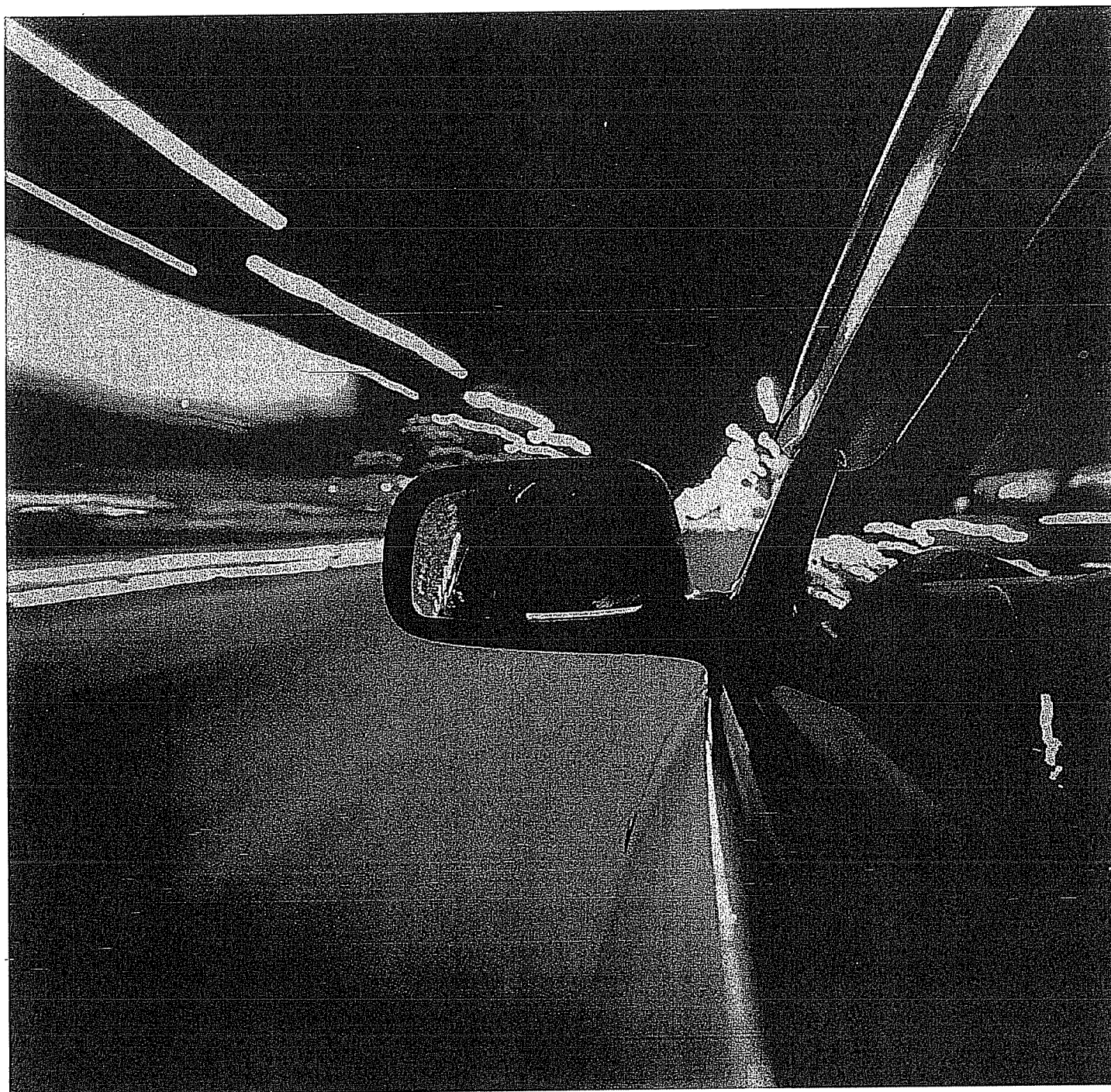
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Acton Tunnel Lighting

Electrical Specification



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Prepared for

TAMS

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1.0 General Requirements

This Specification has been prepared as a brief for the detailed design, documentation, installation, proving, testing and commissioning, comprehensive maintenance and defects liability of the Electrical Services associated with the Acton Tunnel project, Tunnel lighting installation and switchboards, for Parks Way, Action ACT.

1.1 Responsibilities & Statutory Requirements

This Specification sets out the requirements for the electrical services installation. The Electrical Contractor (the 'Contractor') shall be responsible for the manufacture, supply, delivery to site and installation of electrical plant and equipment, including testing, commissioning, defects liability, warranty and comprehensive maintenance, together with operating and maintenance manuals and As-Installed drawings.

The information provided in this document provides the minimum requirements to be achieved. This document and associated drawings in no way removes any responsibility to provide all electrical services systems in compliance with relevant Australian Standards and Department of Transport and Municipal Services (TAMS) Standards.

The Contractor shall be pro-active in the resolution of coordination issues during construction and present a fully functional system at the conclusion of construction. Should conflict arise between the requirements in this specification, applicable Standard/Code or any other requirements stated herein, then the higher standard or more stringent requirement shall prevail.

1.1.1 Asbestos Report

Seek confirmation from the Superintendent as to the outcome of the recommended asbestos survey.

1.2 Standards, Codes and Regulations

Carry out the entire installation strictly in accordance with this brief and in compliance with the requirements of the Network Supply Authority, TAMS and Australian Standards including, without limitation:

Standard	Description
AS1029	Low Voltage Contactors
AS1319	Safety Signs for the Occupational Environment
AS1431	Control Switching Devices for Voltages up to 650V ac and 250V dc. Part 1 and 2
AS1675	Current Transformers – Measurement and Protection
AS1158	Lighting for Roads & Public Spaces
AS1158.5 (2007)	Lighting for Roads & Public Spaces – Tunnels and tunnels
AS1775	Low Voltage Switchgear and Control Gear, Air Break Switches, Isolators and Fuse Combination Units
AS1930	Circuit Breakers for Distribution Circuits (up to and including 1000V a.c.)
AS2052	Metallic Conduits and Fittings
AS2053	Non Metallic Conduits and Fittings
AS2184	Low Voltage Switchgear and Control Gear Moulded Case Circuit Breakers for Rated Voltages up to and including 600V a.c. and 250V d.c.
AS2643	Fluorescent Lamp Ballasts – Performance Requirements
AS3000:2007	"SAA Wiring Rules"
AS3008.1	Electrical Installations – Selection of Cables
AS3100	Approval and Test Specification for definitions and general requirements for electrical materials and equipment.
AS3137	Approval and Test Specification – Luminaires (Lighting Fittings)
AS3147	PVC Insulated and Electric Cables and Flexible Cables for Working Voltages of 0.6/1kV

Standard	Description
AS3190:2002	Approval and Test Specification – Residual Current Devices
AS3198	XLPE Insulated Electrical Cables for Working Voltages of 0.6/1.0kV.
AS3827	Lighting Performance Inaccuracies & Tolerances
AS3349	Switchgear and Control Gear Assemblies for Voltages up to 1000V a.c.
AS4070	Recommended Practices for Protection of Low Voltage Electrical Installations and Equipment in MEN Systems for transient voltages
AS3439.1	Low voltage switchgear and control gear – Type tested and partially type tested assemblies
AS60947.1	Low voltage switchgear and control gear – General rules
AS3947.2	Low voltage switchgear and control gear – Circuit Breakers
AS3947.6.1:2001	Low Voltage Switchgear and Control Gear – Multiple Function Equipment, Automatic Transfer Switching Equipment
AS60947.7.1	Low voltage switchgear and control gear – Ancillary equipment – terminal blocks for copper conductors
AS60947.7.2	Low voltage switchgear and control gear – Ancillary equipment – Protective conductor terminal blocks for copper conductors
AS/ACIF S008:2001	Requirements for Authorised cabling products
AS/ACIF S009:2001	Installation Requirements for Customer Cabling
AS3017:2001	Electrical Installations – Testing and Inspection Guidelines
AS3080:2003	Telecommunications installations – Generic cabling for commercial premises. (ISO/IEC 11801: 2002, MOD)
AS4680:1999	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
AS5000.1:2003	Electrical Cables – Polymeric Insulated – For working voltages up to and including 0.6/1 (1.2) kV
AS/NZS ISO9001:2000	Quality Management Systems Requirements
TAMS Standards	TAMS standard drawings (Section 12) and TAMS requirements.

1.3 Life of Plant

It is the intent of this specification that the tunnel lighting, switchboards and control gear be constructed and fitted out to a high quality. Supply all equipment new and in new condition.

All cables, enclosures and equipment under this Contract shall have a minimum design life of 25 years.

1.4 Performance Achievement

Satisfy the various operational modes and performance requirements included in this specification.

1.5 Workmanship

Workmanship shall be subject to approval of the Superintendent and:

- Comply with the contract documentation;
- Be in accordance with the best modern trade practice;
- Be carried out by appropriately qualified, licensed and experienced tradespeople and apprentices supervised by them;
- Be carried out under the constant supervision of competent forepersons; and

- Result in a high standard of construction to achieve a thoroughly efficient, safe, robust, tidy and fully operational installation.

Install materials and equipment in accordance with the manufacturer's written instructions. Arrange for the installation of all major equipment items to be completely checked by a fully qualified and trained representative of the manufacturer, or his agent. This particularly includes the surge protection devices. All services must be fully concealed. All services must be installed in a logical manner with allowances for future modification.

1.6 Traffic Management

Produce a temporary traffic management plan and submit to Territory And Municipal Services (TAMS) for their approval. Pay all associated fees.

The Contractor shall be responsible for all traffic management associated with these works in accordance with TAMS requirements.

1.6.1 Lighting Installation

To minimise on-site installation time, pre-assemble light fittings onto sections of cable ladder and terminate. The sections of ladder can be installed and terminated to the preceding section as the construction proceeds.

1.7 Contractor's Submissions

1.7.1 Submission Timing

Provide submissions for review as documented but in any case, at least one week prior to procurement for or commencement of the relevant component of the works.

1.7.2 Submissions Required for Approval

Provide the following submissions:

Table 1 List of Deliverables

Ref.	Item	Details	Deliverable (format as agreed with Superintendent)	Timing of Submission
(a)	Equipment Schedules: Distribution Boards Switchgear Cables Light Fittings Cable Supports	Schedules to detail manufacturer, construction, capacities and performance characteristics of all equipment items.	1 x hard copy 1 x electronic copy (pdf)	Two weeks from Tender acceptance
(b)	Shop Drawings	General Arrangement drawings for all distribution boards	2 x hard copy 1 x electronic copy (pdf)	Two weeks from Tender acceptance
(c)	ITP	Inspection Test Plan (ITP)	2 x hard copy 1 x electronic copy (pdf)	Two weeks from Tender acceptance
(d)	FAT	Factory Acceptance Test (FAT)	2 x hard copy 1 x electronic copy (pdf)	Two weeks before factory acceptance testing
(e)	Commissioning and testing schedules	Proposed Site Acceptance Test (SAT) and commissioning schedules	2 x hard copy 1 x electronic copy (pdf)	Two weeks before commissioning
(f)	PLC Configuration Specification	Outline of proposed programmable logic controller (PLC) program structure, addressing and configuration	2 x hard copy 1 x electronic copy (pdf)	Three weeks after Tender acceptance
(g)	Operation and Maintenance Manuals		2 x hard copy 1 x electronic copy	At time of commissioning

Ref.	Item	Details	Deliverable (format as agreed with Superintendent)	Timing of Submission
			(pdf)	

1.8 Testing and Commissioning

Carry out testing and commissioning prior to Date of Practical Completion to clearly demonstrate and record that all works meet the specified performances and have been successfully commissioned as a complete and integrated installation satisfying design intent and agreed commissioning schedules. Test and adjust the operation and calibration of each piece of equipment, individually and as part of a complete operating system to obtain the required performance.

Provide instruments, tools and other test devices certified to National Association of Testing Authorities (NATA) Standards to ensure repeatable and accurate measurements.

1.8.1 Instrumentation

Provide all test equipment and accessories for tests specified herein. At handover, each instrument shall be checked against the instrument data sheet to ensure the correct unit has been supplied.

Prior to installation, each instrument shall be tested for calibration. Calibration tests shall consist of the application of an input signal and measurement of the output signal. Calibration shall verify the accuracy, range, linearity and hysteresis relative to the manufacturer's specifications and the instrument data sheets. Any instruments that do not pass calibration tests shall be immediately reported.

1.8.2 Testing

Test the works in the presence of the Superintendent or his representative and provide 5 working days prior notice to enable attendance. Arrange for all relevant installers to be in attendance unless otherwise agreed in advance with the Superintendent.

Supply all necessary testing equipment, including two-way radios of suitable power and frequency, measuring instruments and the appropriately skilled labour required for conducting the tests. Should any test reveal a fault, correct the fault and re-test prior to Date of Practical Completion.

1.8.3 Commissioning

The Contractor shall record testing and commissioning results on custom test sheets, sign and date the sheets and submit for review prior to Date of Practical Completion. Testing and commissioning results shall demonstrate performance within the acceptance criteria specified.

Prepare and submit a Testing and Commissioning Manual covering all verification and testing items as described and in accordance with Section 8 of AS/NZS 3000. Include:

- A checklist of items based on Section 8 of AS/NZS 3000;
- Thermal scans of all LV switchboards at full load.
- Day to day commissioning program;
- Pro-forma test sheet for the listed tests; and
- Space for inclusion of completed testing and commissioning results.

Operation of switches and circuit breakers and energising of cables, lighting, busbars and transformers, shall be as directed:

- No switching operations shall be carried out without approval;
- All commissioning shall be carried out in a safe manner;
- All control and protective devices shall be correctly adjusted.

1.8.3.1 Pre-Commissioning Checks

Prior to starting the tests, check that:

- The installation is strictly in accordance with the Specification and Drawings, the Wiring Rules and any special Network Supply Authority requirements;
- All equipment is safe to operate, and that overloads, protection equipment, safety devices and interlocks have been properly set and are all in working order;
- Interlocks are in place.
- Phase rotation is correct throughout the site;
- Separation of terminations and anti-arcing shrouding are in place;
- Live conductors are adequately shrouded from inadvertent contact;
- Labels are correct;
- Any automatic controls that might affect the test have been relaxed;
- Any electronic equipment, which may be damaged during testing, is appropriately protected;
- All instruments to be used for testing are suitable for the purpose;
- The commissioning personnel are competent in the relevant fields;
- The Testing and Commissioning Manual and Operating and Maintenance Manual are available to the commissioning personnel and to the Superintendent; and
- The commissioning checklists are available for recording all testing information and results.

1.8.4 Thermal Scan

Prior to practical completion, with the electrical systems at or near full load, provide a thermographic survey, using an approved infra-red sensitive camera, of all LV power distribution boards. Include all busbars, isolating links, switches, circuit breakers and cable joints in the thermographic survey. Remove and replace covers as necessary for this work.

- Results: Record the results of the survey and provide thermograms of any areas showing abnormal temperatures. Provide to the Superintendent two copies of reports (one to be retained at the MSB).
- Specialist: An approved specialist Subcontractor experienced in thermographic survey work shall carry out the work.
- Rectification Work: All components, joints, etc, which show the presence of abnormal temperatures shall be checked and the fault rectified and a subsequent thermographic survey shall be carried out to prove that the problem has been rectified.

1.8.5 Lighting Operation

The following are the minimum commissioning tests to be carried out for lighting circuits and equipment (in addition to those test specified in Section 8 of AS/NZS 3000):

- Operational test for all luminaires;
- Operational test of day time switching levels and measurement with lux meter at calculation points nominated by the Superintendent;

- Operational test of light levels at night and measurement with lux meter at calculation points nominated by the Superintendent;
- Commissioning of all photometers;
- Commissioning of PLC and automatic lighting control system
- Simulate fault conditions (mains fail, PLC fault etc)
- Commissioning of UPS.

1.8.6 Submission of Test Results

Test results for equipment associated with energising of supplies shall be presented in separate and discrete packages with the results presented in a logical order to facilitate time efficient review and acceptance.

After the submission of each test package, there shall be a review meeting with the Superintendent for verification that all required tests have been performed and approval of test results.

The review meeting shall be held as soon as possible but no later than two (2) days after receipt of the test package by the Superintendent.

1.9 Certificates of Compliance

Certify on completion that the works comply with the requirements of AS/NZS 3000, the Network Supply Authority Regulations and any other applicable rules or regulations.

Certificates shall be in a form acceptable to the responsible Authority and shall be addressed to them. Provide copies for the Superintendent.

1.10 Defects Liability & Extended Warranty

The works as detailed at tender and any approved variations shall be under comprehensive warranty for the Defects Liability Period of 52 weeks. Should a failure occur during this time, supply all labour and materials free of charge to rectify the fault.

Defects include any faults arising from defective design, installation, commissioning, materials, equipment or workmanship which arise in the Works when under continuous normal and proper use.

Provide an emergency breakdown service, available for 24 hour attendance. Provide a telephone contact number to the Superintendent for use by the Principal in the event of a breakdown or malfunction. Attend to emergency requests for service within 2 hours of the lodgement of the call.

Attend to non-urgent calls in not more than 24 hours.

Provide new replacement parts and consumables of the same model and manufacture as the originals.

1.11 Penetrations

1.11.1 Fire Walls, Floors And Structural Members

Refer to the Building Code of Australia (BCA) for restrictions on size and spacing of penetrations. Do not penetrate without written approval. Seek direction from the Superintendent for sealing details.

1.11.2 Damp Courses

Do not penetrate.

1.11.3 Existing Structures

Seek direction from the Superintendant for penetrations through existing structures.

1.11.4 Sleeves

Fit a UPVC sleeve for each penetration through on-grade floor slabs, on-grade floor beams and external walls for cables not enclosed in conduit.

1.11.5 Penetration Size

Provide a penetration of diameter 10 mm greater than the pipe or sleeve diameter for pipes and sleeves penetrating existing external walls, on-grade slab, or on-grade floor beams.

1.11.6 Sealing

Seal penetrations around conduits and sleeves with a weak sand:cement mix, or similar sealing compound. Seal the space between cables within sleeves with a pliable waterproof compound.

All sealants to be low VOC.

1.12 Equipment Selection & Returnable Schedules

Plant and equipment details shall be included in tender return schedules (Appendix A), with final selection approved by the Superintendent. Equipment shall be selected to ensure replacement fittings / parts are readily available and shall be from well established locally available product ranges

2.0 Scope of Works – Electrical Services

2.1 Overview of Works

Within the Acton Tunnel lighting upgrade, there are two carriageways, each with three lanes and an emergency stopping / bicycle lane.

The Electrical Services work includes, without limitation, the services co-ordination, manufacture, supply, installation, testing, commissioning of electrical and associated services including:-

- Traffic Management
- Modifications to tunnel walls/ceiling cladding/material
- Demolition of existing lighting fixtures and cabling
- Replacement/upgrade of circuit breakers, automatic transfer switch and PLC
- Provision of new lighting fixtures, support and cabling
- Provision of new uninterruptible power supply (UPS) and control switchgear
- Ancillary items as documented (eg. future supply cabling for traffic warning signs)
- Clean and relamp of existing emergency exit signs.
- Full system testing and commissioning;
- Manuals and training;
- Comprehensive preventative maintenance, warranty and defects liability.

2.1.1 Asbestos

Presently, the Acton Tunnel is subject to a recommended Asbestos Survey since asbestos was documented for the existing wall cladding and ceiling cladding. Seek confirmation from the Superintendant as to the outcome of the asbestos survey and in any case, upon detection of any asbestos seek direction from the Superintendant prior to disturbing it.

3.0 Electrical Power Distribution

3.1 Power Supply Criteria

The voltage of all equipment and circuits shall be clearly indicated.

The 400/230V AC equipment shall be capable of continuous satisfactory operation with normal voltage variations of +10% to -6% and frequency variations of $\pm 2\%$. This also applies to downstream equipment fed from step-down transformers and unconditioned power supply. Electronic circuitry shall be adequately rated and fitted with voltage and current surge protection and shall be neither a source of, or susceptible to, Radio Frequency Interference (RFI).

The supply shall be via two separate substations as documented on the single line diagram (SLD).

3.2 Network Supply Authority

The Network Supply Authority is ActewAGL.

3.3 Balancing of Load

Balance the load as evenly as possible over all phases at Practical Completion. Measure the load on each phase at each switchboard and make circuit re-connections followed by further load measurement and re-connections to achieve the required load balance. Provide amended As-Installed drawings, circuit schedules and labelling to reflect any changes.

3.4 Uninterruptible Power Supply

Provide an uninterruptible power supply (UPS) sized to adequately supply the documented load as shown on the single line diagram.

3.4.1 Standard

Comply with:

General: To AS 62040.2 and AS 62040.3.

Converters: To AS 60146.2.

Batteries: To AS/NZS 4029.2 or AS 4029.3.

Batteries installation: To AS/NZS 2676 series and AS/NZS 3011 series.

3.4.2 Submissions

Submit technical data for the selected UPS prior to procurement.

3.4.3 Certification

Provide certification:

Quality management: Submit manufacturer's ISO 9001 certification for the installation.

Warranty: Provide statements of warranty and guarantee for all components of the system.

3.4.4 Performance

Provide a UPS suitable for installation in the main switchroom as documented.

Module type: Multi-module.

Mode: Single.

Redundancy: none.

Operation: On-line double conversion.

By-pass supply: Prime.

Automatic bypass: Provide an automatic, no break, integral static by-pass switch with automatic reset to transfer the load automatically to the by-pass supply when the UPS output characteristics are outside the designated limits.

3.4.5 Battery Performance

Type: Sealed lead acid, recombination type.

Service life: ≥ 10 years.

Warranty 3+7 years minimum

3.4.6 Remote functions

General: Provide output relays for the following conditions:

- Summary alarm.

Requirement: Provide communications facility to enable the transfer of comprehensive status and history information to an external monitoring system via the following protocols:

- Low level relay (general alarm)
- SNMP (for future connectivity).

3.4.7 Graphical display

General: Provide an integrated electronic graphical display showing the major UPS components and parameters. The display shall indicate the statuses and facilitate control functions.

3.4.8 Completion tests

Inspection and Acceptance: Provide >1 week notice for all testing to allow witnessing by the principal or principal's representative.

General: Test run the UPS system continuously connected to the test load, for at least 48 hours. Record line and load voltage, current frequency and temperature measurements.

3.4.9 Selections

Table 2 Special service conditions schedule

Environmental	
Temperatures	0°C - 40°C
Humidity	0% - 95% (non-condensing)
Altitude	0 to 1000 m
Mechanical	
IP Rating	Minimum IP20

Table 3 Inputs schedule

Primary/Secondary supply	
Supply configuration	Network Supply Authority mains
Supply voltage/variatioins	230/400 V +15%, -20%
Supply frequency/variatioins	50 Hz +40%, -20%

Total harmonic distortion-input (THDI)	5% from 0% to 100% load
Harmonic requirements	≤5% total harmonic distortion-voltage (THDV) at the point of common coupling (PCC)
Input power factor	≥0.95 at 100% load

Table 4 Output schedule

Rated output power	5 kVA (min)
Rated power factor	0.8
Number of phases	1
Nominal output voltage	230/400 nominal

Table 5 Rectifier/battery charger schedule

Charger capacity	100% inverter load and recharge batteries to 95% within 15 hours
Charger ripple voltage	≤20 mV (or to battery manufacturer's requirement)

Table 6 Battery schedule

Type	Sealed lead-acid battery bank provided for each UPS.
Capacity (ampere hour)	Sized to provide autonomy of 10 minutes for each UPS.
Design life	10 years (start of life)
Warranty	3+7 years.

Table 7 On-site tests schedule

Interconnection cable check	Required
Light load test	Required
UPS auxiliary devices test	
Synchronisation test	

a.c. input failure test	Required
a.c. input return test	Required
Simulation of parallel redundant UPS fault	
Transfer test	
Full load test	Required
UPS efficiency test	Required
Unbalanced load test	
Balanced load test	
Current division in parallel or parallel redundant UPS test	
Rated stored energy time test	
Rated restored energy time test	Required (Show calculation based on battery recharge rate)
Battery ripple current test	Required
Overload capability test	
Short circuit test	
Short circuit protection device test	
Restart test	Required
Output overvoltage test	
Periodic output voltage variation test	
Frequency variation test	
Radiofrequency interference and conducted noise tests	
Harmonic components test	Required
Earth fault test	
On-site ventilation test	
Environmental tests	
Vibration and shock tests	
Audible noise tests	

Standby generator compatibility test	
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4.0 Distribution Boards

4.1 Requirement

Retain existing distribution boards. Demolish existing circuit breakers as documented and replace with new as required to suit the new number of circuits.

Replace labelling as required to completely describe all circuits.

Clean existing boards as well as the main switch room to remove dust and dirt that may affect long term operation of the uninterruptible power supply (UPS).

Provide a laminated single line diagram wall-mounted in the main switch room, near the entrance door.

4.2 General

All works performed on distribution boards shall comply with AS/NZS 3000 and AS/NZS 3439.1

Electrical equipment requiring ready access for operation, maintenance and adjustment shall not be less than 300mm and not greater than 2000mm above the floor or base of the Distribution Board.

Internal terminals and wiring of enclosures shall be arranged such that separation and segregation is maintained between cables and cores of different voltages in accordance with AS/NZS 3000.

4.3 Construction

4.3.1 Labelling and Identification

Replace or update all labelling to suit all new works, including UPS and emergency lighting circuits etc.

All equipment including distribution boards, junction boxes, socket-outlets, lighting switches, load control stations, field instruments, field cabinets, equipment etc. shall be provided with identification and maximum internal voltage labels. Labels shall include the circuit number, equipment number or tag number, and the designated name or description of the equipment.

Lighting fixtures shall be labelled if they are emergency fittings or if they are on circuit #1.

All enclosures, equipment, relays, internal equipment, terminals strips etc. shall be permanently labelled in accordance with the switching drawings.

Labels shall be phenolic laminate (traffolyte) with engraved capital letters as follows:

Indoor and Outdoor Equipment	White/Black/White
Critical Identification (i.e. Safety Devices)	Red/White/Red

Letter sizes shall be as follows:

Danger Labels	25 mm
Distribution Boards, Panels, Field Cabinets etc	12 mm
Instruments, Control Devices, Socket Outlets, equipment etc	5 mm

Labels shall contain the following information as a minimum:

Switchboards	Switchboard name and equipment number and where fed from.
Control Equipment	Circuit name, circuit designation and control description.

Power Outlets and Light Fittings	Description, supply point and circuit number.
Lighting and Distribution Boards	Name and equipment number.
Communications Equipment	Description and equipment number.
Lighting Fixtures	Identification number & Circuit #

Labels for distribution boards and panels shall be fixed to the board or panel front. Labels for control devices, junction boxes, instruments, power supplies, communications equipment etc shall be fixed to adjacent structures and not to the equipment.

Equipment and instrument stands, support brackets and plates shall allow for the mounting of labels in a prominent location.

The integrity of equipment or enclosure IP rating shall not be compromised by the affixing of labels.

Labels shall be fixed by stainless steel or chromium plated screws only. Adhesive labels shall not be used. Label holes shall be slotted for expansion. Labels 150 x 25 mm or larger shall have at least four fixing screws.

Submit an engraving schedule and sample label size for approval prior to the manufacture of the labels.

Distribution boards shall be provided with a typed laminated circuit schedule mounted inside the distribution board door. Schedules shall include the circuit function and circuit breaker rating. Circuits shall be identified adjacent to the circuit breaker with phenolic laminate labels as shown on the Drawings.

4.3.2 Safety Notices & Barriers

Notices

Fix "Danger" notices, "Out of Service" notices, or similar to equipment or wiring which is or may become live or where a warning is necessary.

Barriers

Provide substantial barriers which are locked or otherwise firmly secured to prevent accidental personal contact with live equipment or wiring. All electrical terminations shall be shrouded to IP20 or better. Provide shrouds to each main switch to allow safe access to the switchboard without isolating the incoming supply.

A clear cover (Perspex or equivalent) shall be installed to minimise the likelihood of a finger touching live surfaces immediately after the Distribution Board is opened. An appropriate Danger sign complying with AS1319 shall be fixed on such covers, and also on the inside of the door as per DMR Standard – PSTS228, Section 5.4.3 Electrical Safety Warning/Isolation.

4.3.3 Uninterruptible Power Supply

Provide a 5kVA Uninterruptible Power Supply (UPS) capable of 30 minutes battery backup as shown on the main switch room plan. The UPS shall supply existing DB-EL, which shall supply the emergency lighting circuits, Micrologix PLC and a 24V DC power supply for the PLC I/O.

4.3.4 Emergency Lighting

Emergency lighting circuits shall be supplied by the existing DB-EL as shown in the SLD.

4.3.5 Tunnel Lighting

Tunnel Lighting shall be supplied as shown on the SLD. Each three phase (daylight light) circuit shall be protected by a three pole circuit breaker and supplied via closing of the corresponding 3-position Switch as shown in the lighting control schematic.

4.3.6 MicroLogix PLC

Provide an Allen Bradley MicroLogix PLC supplied via UPS in the existing lighting control cubicle (replacing the existing PLC and dimmer equipment).

The PLC shall comprise of a CPU module with Ethernet port and RS422 serial port, a Digital Input module, Digital Input expansion module, DC Input/Relay Output module, and an Analogue Input module.

The PLC shall read inputs from:

- The UPS
- The door limit switch
- Field-mounted photometers and
- The 'Lights Off' status of circuits for each controlled lighting circuit via interposing relay contacts.

The PLC controls the operation of Warning/Alarm relays corresponding to Warning/Alarm conditions determined by fault inputs. Presently these outputs shall only activate within the main switch room. In future these relays will be remotely monitored.

4.4 Switchgear

Provide circuit breakers for new circuits as documented.

The circuit protection devices shall be rated for full current and starting current of the connected load. The make and break capacity shall as a minimum be equal to the calculated prospective short circuit fault current and shall match that of the cubicle into which they are installed.

Circuit breakers supplying tunnel lighting shall incorporate residual current device (RCD) protection with a shunt trip to ensure short circuit protection.

4.4.1 Discrimination

Select all circuit protective devices such that full discrimination between each device is achieved.

4.4.2 Circuit Breakers

MCB's shall have prospective fault rating of 6kA, be equipped with manual spring assist closing mechanisms, and shall have provision and accessories for locking the mechanism in the Open/OFF position.

MCCBs shall have prospective fault rating of 35kA, be equipped with manual spring assist closing mechanisms with clear indication of the open, closed or tripped positions, and shall allow for locking the mechanism in the Open/OFF position.

4.5 Terminals

Terminals shall comply with AS60947. Provide enough terminals to terminate all cores of all cables, with provision for 20% spare capacity.

Terminals for communication, digital and analogue signals within the Distribution Boards shall be physically separated / segregated.

All Distribution Boards shall be fitted with numbered terminals and mounted in accordance with supplier's recommendations.

Terminals shall be manufactured from self-extinguishing materials and be DIN rail mounted 3-way terminal blocks for the total number of circuits required, plus spare terminal blocks for future capacity. They shall be adequately sized to take the conductor(s) which they connect to suit a maximum conductor size of 35mm² with the smallest terminals being capable of taking stranded conductors up to 2.5 mm².

Metal parts shall be not less than 85% copper and be nickel plated to prevent corrosion.

Earth terminals shall be green or green/yellow. Other terminals shall not be the same colour as earth terminals.

All terminals shall be of the same Manufacturer throughout.

They shall be labelled using the terminal Manufacturer's proprietary labelling system. Terminal numbers shall match the As-Built Drawings.

5.0 Cables

5.1 Cable Segregation and Spacing

Cable segregation shall comply with AS/ACIF S009:2001 and AS/NZS 3000 standards.

Instrument signal, communications and Extra Low Voltage carrying cables may be grouped together and these cables shall be separated from all other power cables by a minimum of 150mm. If this distance cannot be achieved, then a metallic, flame-proof barrier shall be installed between the cables to be segregated along the entire length of the installation.

Equipment power, low voltage control cables, lighting and small power cables may be grouped together.

Telecommunications cables installed parallel to electrical power cables shall be separated as specified in Table 1 of AS 3080:2003, by no less than 300mm. All crossovers of power and communications cabling are to be at 90°.

5.2 Control and Data Cable

All control cables shall be multicore and earth, 1.5mm² minimum stranded copper conductors (7/0.50mm), black outer sheath with white numbered cores and V90 0.6/1kV, PVC/PVC insulated to AS 5000.1:2003

5.3 Analogue and Instrument Signals Cable

Multicore cables shall be twisted, individually screened pairs of stranded plain annealed copper conductor or 0.5mm² minimum size (7/0.30mm) with V90 PVC insulated cores, V90 PVC insulated sheath (numbered pairs of black and white cores).

The cables shall be Olex Cables "Dekron" or equivalent.

5.4 Internal PLC Wiring

Single core and multicore cables for use as internal wiring in panels between the PLC and terminals for the Digital I/O shall be stranded plain annealed copper conductors of 1.0mm² minimum size with white V90 PVC insulation to AS 5000.1:2003.

Internal wiring for analogue PLC signals shall be twisted, individually screened pairs of stranded plain annealed copper conductor of 0.5mm² minimum size (7/0.30mm) with V90 PVC insulated cores and outer V90 PVC sheath (numbered pairs of black and white cores).

5.5 Data Communications Cable

Cables shall be 4Pr, Cat 5 high performance, Shielded Twisted Pair (S/UTP), data grade cable, suitable for use at data rates of at least 100Mbps.

All conductors shall as a minimum be of 1/0.59mm solid bare copper, adjoined twisted pairs.

All conductors shall be band-stripped colour coded.

All cables shall carry UL verification of ANSI/TIA/EIA 568-B.2-1, shall be Cat 5 verified to AS/ACIF S008:2001 and shall carry the A-Tick symbol or shall have an Austel permit. No other cable shall be permitted for high speed data applications.

5.6 Termination

All strands or conductors shall be twisted together before inserting in approved terminal clamps, crimp/compression lugs or pre-insulated copper circular pin connectors. Crimping shall be carried out using ratchet type crimping tools.

Bare wire terminations are not acceptable. Unused cores shall be terminated where possible to unused terminals or the ends taped and coiled back into ducts for future use.

Terminals shall be sized and arranged so that one wire only is terminated in each side of each terminal block. Proprietary bridging links shall be provided for multi-terminations.

All wiring shall be carried out in a neat and workmanlike manner. It shall be either neatly loomed and supported with nylon cable ties at 100 mm maximum intervals, or enclosed within wiring ducts with at least 30% spare capacity.

Connections and wiring shall be arranged with special care to prevent overheating resulting from bunched conductors and to give a tidy appearance.

All cables passing through gland plates shall be finished off with approved weatherproof, compression type metallic cable glands. A PVC weatherproof shroud shall be fitted to each gland.

All necessary thread adaptors (brass/stainless) for cable terminations (reducers/NPT-metric etc) shall be supplied and installed.

5.6.1 RJ45 Data Connections

Data terminations shall be RJ45 modular jacks complying with the Cat 5 standard and rated by the manufacturer for use up to at least 100Mbps data rates.

RJ45 connectors shall have a minimum gold plating of 1.3 microns, and shall be suitable for over 400 reconnections.

The connectors shall as a minimum meet the following technical requirements when tested in accordance with AS 3080:2003 and shall meet the requirements of the proposed Cat 5 connecting hardware.

All twisted pair cabling shall be terminated using insulation displacement techniques. Cable shall be twisted up to the point of termination to minimise cross-talk between pairs.

All RJ45 plugs and sockets shall be wired in conformance with the EIA preferred pin/pair assignment T568A and shall carry the A-Tick symbol or Austel approval number.

Separate pairs are to be allocated exclusively for analogue voice, digital data or voice and power functions.

Cables are to be labelled before the connector is terminated on the cable.

5.7 Labelling and Identification

Cables shall have identification printed or marked on durable labels on the outer sheath at regular intervals, with the following information:

- manufacturer's name or identifying initials;
- year of manufacture;
- type of cable; and
- metre markings.

5.7.1 Labelling & Markers

All cables shall be labelled at both ends (once terminated) with non-corrosive, non-fade, UV stabilised, vermin-proof labels clearly labelled with the cable number nominated on the drawings. The cable labels shall be positioned in an accessible position adjacent to the point of termination to facilitate cable identification.

All cores of control, instrumentation and communication cables terminating within the Distribution Boards, field cabinets, junction boxes etc shall be fitted with ferrules and identified in accordance with the drawings.

All wiring shall be labelled with "Graphoplast 100 Series" or equivalent transparent continuous sleeve cable marker system at both ends of the conductor. Numbers and letters shall be black on a white background. Wire numbers for spare cores not shown on the drawings shall be labelled as "SPARE".

All markers shall be correctly sized for each conductor core to minimise movement through gravity or vibration. Markers shall be neatly lined up, read from bottom to top for vertically terminated cables and left to right for horizontally terminated cables, and shall be left clearly visible when viewed from the front with the enclosure door open.

5.8 Colours

The following primary insulation colours shall be used:

Core	Multiphase Installations (Colour)	Single Phase Installations (Colour)
Active	Red, White and Blue	Red
Neutral	Black	Black
Earth	Green and Yellow	Green and Yellow
LV Control	White with numbered ferrules	White with numbered ferrules
ELV Control	Purple with numbered ferrules	Purple with numbered ferrules

5.9 Manufacturer's Recommendations

Install, terminate and joint cables in accordance with the manufacturer's recommendations.

5.10 Handling

Ensure that cable sleeving or sheathing is not damaged.

5.11 Installation

Conceal cables unless noted otherwise. Proposed major cable routes and installation methods are generally shown on the drawings and described in the specification. Where a more suitable route is found, seek approval from the Superintendent to utilise the alternative route.

Perform cable calculations to re-confirm cable selections for any alternative route.

5.12 Tunnel Lighting Cables

5.12.1 Requirement

Supply and install tunnel lighting cables from each Distribution Board to all corresponding lighting circuits cable ladder.

The central (HPS) lighting fixtures shall be subject to daylight switching control by the PLC. The lateral (fluorescent) lighting fixtures shall not be switched

Standards

Generally: to AS/NZS 3000 and AS 3008.1

Selection of cables: to AS 3008.1

Elastomer insulated cables: to AS 3116

PVC insulated cables: to AS 3147

Flexible cords: to AS 3191

5.12.2 Joints

All cabling shall be continuous. Joints will not be permitted.

5.12.3 Cable Selection

Apply AS 3008.1 for the determination of current ratings, voltage drop and de-rating where applicable. Submit calculations for approval prior to selecting/procuring tunnel lighting cable.

Cables for supply to lighting circuits shall comply with the specifications of the Cable Schedule and as a minimum shall meet the following requirements:

- LSZH (Low Smoke Zero Halogen),
- 4C+E 0.6/1kV XLPE insulated, PVC sheathed AS 5000.1, copper conductor, 90 °C.

Cables for incoming supply to **emergency lighting** circuits shall comply with the specifications of the Cable Schedule and as a minimum shall meet the following requirements:

- Fire Resistant cabling; Olex Pyrolex Ceramifiable or equivalent.

6.0 Conduits and Cable Supports

6.1 Requirements

Routes and support details where shown on the drawings are indicative only. Cables, supports and enclosures shall be installed with all necessary bends, set ups/downs, etc. in addition to those shown in the above drawings as may be required for wiring in this specification.

All steel shall be hot dipped galvanised to protect from corrosion. The sizes indicated on the cable ladder drawings are minimum sizes and may be increased to facilitate cabling, to suit manufacturer's standard sizes, or to suit the requirements of the Contract.

Only manufacturer's standard fittings shall be used for bends, angles, tees, offsets etc.

6.2 Cable Ladder

Cable ladder must meet the minimum requirements of the Tunnel Lighting Cable Ladder General Arrangement drawing. Materials used for the construction, support and fixing of cable ladder systems shall be selected for their suitability to the site conditions.

Cable ladder and associated proprietary items shall be Heavy Duty galvanised steel, "Unistrut" type NEM 20B in 6m lengths, a standard width of 450mm and nominal rung spacing shall be no greater than 300mm.

Cable ladder shall be manufactured from galvanised steel, and shall be provided in pre-assembled 6m (maximum) sections with 3 supports per section.

Each pre-assembled section must be able to support the number of luminaires as indicated on the drawings. It is recommended to limit the length of cable tray section to 3m for ease of handling.

Splice plates shall be manufactured from copper free aluminium alloy, and come supplied with splice plate bolts and flange nuts.

The maximum allowable deflection of installed and populated cable ladder shall be no greater than 10mm at any point.

Nuts, screws, bolts, spring and flat washers etc shall be galvanised steel.

Only one manufacturer's ladder and accessories shall be used in this Contract; all bends, reducers, risers, tee-sections, cross sections, compression, vertical and horizontal splices, hold down clamps, covers and cover clamps shall be proprietary items from one manufacturer.

6.3 Bends, Risers, Reducers, Tees and Crosses

Bends, risers, reducers, tees and crosses shall be of the same manufacture, grade, material and standard as the cable ladder.

Standard pre-formed bends, risers, tees and crosses shall be used where possible, and these shall connect directly to the cable ladder without the need for splicing plates. The inside radius of bends, risers, tees and crosses shall be no smaller than 300mm. Cables shall not be bent beyond the cable manufacturer's minimum

bending radius. Where the cable manufacturer's minimum bending radius is larger than the cable ladder standard, the Contractor shall fabricate cable ladder bends, risers, tees and crosses using the cable ladder's proprietary horizontal and/or vertical splice plates respectively.

Reducers shall taper on both ends of the cable ladder and shall not present any sharp corners or edges to the installed cable.

7.0 Earthing

7.1 Earthing Method

Earthing methods and systems shall be in accordance with relevant sections of AS/NZS 3000. Provide earths in accordance with requirements for MEN system and Network Supply Authority.

Provide earth conductors with all submains and subcircuits.

7.2 Earthing of Equipment

The earth connection of equipment to its supply switchboard shall be one of the following methods:

- For multicore cables, a separate insulated earth core of suitable size.
- For single core supply cables, a separate insulated earth core of suitable size shall be provided.

Every earth wire or cable shall be terminated on a separate stud or bolt with flat washers, a nut and locknut. Bolts or studs used to support or join busbars shall not be used for termination. Where bolts are used, the paint or coating shall be stripped to bare metal before bolting. No two earth wires are to be connected to the same lug, bolt or termination. Where multiple earth cables are to be terminated, a dedicated earth bar shall be installed.

All electrical equipment and panels shall be bonded to earth.

The communications earthing system (CES) shall be separate from the electrical power earthing system except for a single equipotential bonding connection to the main earth bar.

Screens on cables and wiring shall only be earthed at the main panel end, not at the field equipment end.

Disconnection of any one item connected to an earth system for testing or maintenance shall be possible without interfering with the earthing of other items of equipment.

8.0 Tunnel Lighting Control Philosophy

8.1 PLC Control

An Allen Bradley Micro Logix 1100 PLC shall provide automatic lighting control with provision for manual switching of daylight lighting levels.

8.1.1 Inputs

Item	Type
Photometer (Eastbound)	Analogue
Photometer (Westbound)	Analogue
Phase Failure Relay (supply 1)	Digital
Phase Failure Relay (supply 2)	Digital
UPS failure alarm	Digital (coordinate with selected UPS)
Door Alarm Limit Switch	Digital
Lights Off Alarm Relay Circuit #1 (power circuit one)	Digital
Lights Off Alarm Relay Circuit #1 (power circuit two)	Digital
Lights Off Alarm Relay Circuit #2 (power circuit one)	Digital
Lights Off Alarm Relay Circuit #2 (power circuit two)	Digital
Lights Off Alarm Relay Circuit #3 (power circuit one)	Digital
Lights Off Alarm Relay Circuit #3 (power circuit two)	Digital
Lights Off Alarm Relay Circuit #4 (power circuit one)	Digital
Lights Off Alarm Relay Circuit #4 (power circuit two)	Digital
Lights Off Alarm Relay Circuit #5 (power circuit one)	Digital
Lights Off Alarm Relay Circuit #5 (power circuit two)	Digital
Allowance for 10 spare inputs for future power system monitoring	Digital

8.1.2 Outputs

Item	Type
Switching Output Relay Circuit #1 (power circuit one)	Digital
Switching Output Relay Circuit #1 (power circuit two)	Digital
Switching Output Relay Circuit #2 (power circuit one)	Digital
Switching Output Relay Circuit #2 (power circuit two)	Digital
Switching Output Relay Circuit #3 (power circuit one)	Digital
Switching Output Relay Circuit #3 (power circuit two)	Digital
Switching Output Relay Circuit #4 (power circuit one)	Digital
Switching Output Relay Circuit #4 (power circuit two)	Digital
Switching Output Relay Circuit #5 (power circuit one)	Digital
Switching Output Relay Circuit #5 (power circuit two)	Digital
Allowance for 20 spare outputs for alarm signals	Digital

8.1.3 System Operation

Two luminance meters located at the SSD measure the light at the portal entrance and provide a 4-20mA signal into the PLC. The PLC takes the average of these signals to calculate the process variable. Setpoints in the PLC determine the 12.5%, 25%, 50%, 75% and 100% switching levels for daytime lighting. The PLC checks the analogue input signals to determine the error and compares the error against the warning and alarm setpoints. In the warning condition, the PLC shall use the higher value from the luminance meters to determine day time switching levels. If the alarm condition is reached (e.g. one meter goes open circuit), then the PLC continues to use the healthy signal as the process variable. However, an alarm relay is set (in future this will be reported to a Traffic Management Centre (TMC)).

The lighting levels shall default to 50% under the following conditions:

- Total signal failure from the 4-20mA analogue inputs of the photometers;
- PLC fault condition

Connect each final subcircuit through an interposing relay into the PLC to monitor the energised status of the lighting circuits.

The PLC shall also monitor other switchgear such as the UPS, ATS and main isolator trip status.

8.2 Day/Night Switching

The PLC switches only the nominated lights (HPS) for daytime lighting. Night time lighting (fluorescent) shall remain on 24-hours so as to prolong the lamp life as shown on the lighting control schematics.

8.3 Manual Control and Test Facility

3-way selector switches shall allow maintenance personnel to bypass the PLC control and manually select ON (100%), OFF (0%) or AUTO (level set by PLC) for lighting levels.

Provide a "Test" button with spring return that will facilitate a 30 minute discharge test on the emergency lighting. The spring return shall allow the system to automatically revert back to normal supply once the test is complete. Provide contactors controlled by the test button, on the supply to the UPS as well as DB-A and DB-E to interrupt supply to all fluorescent lighting fixtures as shown.

8.4 Mains Failure

Phase failure relays

General: Provide separate solid-state phase failure relays which release at the following:

< 85% of normal voltage.

Single phase failure.

Reverse phase sequence after an appropriate time delay.

Sensing circuit: To reject induced voltage spikes and disturbances with frequencies other than 50 Hz.

Back-up protection: Provide high rupturing capacity fuses to each phase.

Automatic transfer switch

General: Provide separate solid-state phase failure relays which release at the following:

Transfer switch: Electronic automatic. Single phase (output)

General

Provide a 3-phase failure relay (sensing over/under voltage, off-frequency) to sense for loss of mains supply to the tunnel lighting.

Upon sense of loss of mains, the PLC shall switch off all luminaires connected to that supply and upon resumption of supply, start a timer (0 - 10 minutes adjustable) to delay re-activation of lighting fixtures until mains is steady and the appropriate lighting level has been determined and switched accordingly. The PLC shall maintain a minimum time delay after switching off any HPS lighting fixtures before switching them on again.

The emergency lighting is supported by two diverse mains supplies.

If the 'normal' mains supply fails, the ATS shall switch to the 'backup' supply. If the 'backup' mains also fails, the emergency lighting shall be supplied by the UPS for as long as the batteries allow (nominally 30 minutes). Upon resumption of either supply, the UPS shall relinquish load to the mains supply and recharge its batteries.

9.0 Painting Finishes Sealants

9.1 Painting And Finishes

Finishes shall suit the application and ambient conditions and shall be long lasting and of good appearance.

Painting: Use experienced tradesmen painters.

Finish: Clean and polish paintwork at completion of construction. Touch up damaged paintwork to the Superintendent's approval.

Method: Painting shall be carried out to the manufacturer's recommendations and to relevant standards.

Testing: To AS 1580 relevant tests for application.

9.2 FASTENINGS

All equipment including switchboards, luminaires etc., shall be firmly fixed in position.

Type: Use threaded fasteners to allow removal and replacement. Galvanised expanded metal anchor type generally in masonry and concrete. Material shall be selected which will avoid corrosion. Select fastener appropriate for duty and loading.

Explosive Powered Fastenings

Do not use explosive powered tools.

9.3 Sealants & Adhesives:

Requirement: It is recommended that any sealants and adhesives used should have a maximum VOC content as specified below.

Sealant VOC Limits

Reference: South Coast Air Quality Management District (California, U.S.) – Rule 1168.

The VOC limits are less water & less exempt compounds.

Compliance Testing: Refer South Coast Air Quality Management district Rule 1168 for testing methods & exempt compounds.

Architectural sealants: <250 grams of VOC per litre.

10.0 Documentation

Submit manuals for review prior to practical completion.

Provide three (3) sets of completed Operation and Maintenance manuals.

Include all necessary information in the Operation and Maintenance Manuals to enable the successful operation of systems and carry out regular and routine effective maintenance of the systems.

10.1 General

Operation and Maintenance manuals shall detail fully in English the operation and maintenance of the system(s), including all major components and subsystems. Documentation written in multiple languages shall not be accepted.

Final Operation Manuals and Maintenance Manuals shall be provided prior to Practical Completion. The Operation and Maintenance Manuals, including electronic copies on a CD-ROM, shall be provided and all information contained therein shall be specific to the System. A copy of all documentation listed within this section shall be provided on CD-ROM.

Draft operations and maintenance manuals shall be provided to the Superintendent for comment in sufficient time for suitability of the manuals to be assessed, comments incorporated in the manuals and the manuals to be produced prior to Training and Practical Completion. The submission of draft manuals shall constitute a **Hold Point** until approved by the Superintendent.

In general, all manuals shall comply with the following requirements:

- Manuals shall comprise hard cover, three or four hole loose leaf A4 or A3 size binders complete with embossed covers and spines.
- Information shall be comprehensive, clearly set out, indexed, complete with card dividers and page numbers.
- All text shall be printed on high quality bond paper.
- Drawings and diagrams shall be bound into the manuals to facilitate reading from top to bottom, left to right.
- Drawings and diagrams larger than A3 shall be photo reduced to A3 and enclosed in the manual.
- Legibility of all documentation shall be of the highest order and second or third generation copies are not acceptable.

All documentation shall be specific to the equipment and "As Constructed" installation supplied. Brochures and standard catalogues shall be provided as support information. The relevant sections of the brochures and catalogues shall be highlighted in a neat legible fashion.

10.2 Operation Manuals

Operation Manuals shall contain only information that is relevant to the "As Constructed" system and shall be compiled generally as set out below:

- Cover sheet with name of the Works, Contractor's or Supplier's Contract Numbers, Contractor Name and Address.
- Comprehensive index.
- Section 1 - General Description.
- A non-technical section which gives a brief overall description of the Works.
- Section 2 – Theory of Operation.
- A description of the theory of system operation including all subsystems.
- Section 3 - System Operations.
- A description of the function and operation of all systems and subsystems including but not limited to the following:
 - Safety guidelines and instructions.
 - Operator task instructions.
 - Operator maintenance instructions.
 - Self-test, diagnostic and fault finding procedures.
 - Each subsystem operation.
 - Operator and engineer level system configuration.

10.3 Maintenance Manuals

Maintenance Manuals shall contain only information that is relevant to the "As Constructed" system and shall be compiled generally as set out below:

- Cover sheet with name of the Works, Contractor's and Maintainer's Contract Number, Contractor/Maintainer's Name and Address.
- Comprehensive index.
- Section 1 - General Description.
A non-technical section, which includes:
 - an introduction with a brief overall description of the System;
 - details of the Contractor, major sub-contractors, suppliers and designers and the scope of Works undertaken by each.
- Section 2 - System Description.
System information providing details on interfaces, communications, system level fault analysis aids and full spare parts list with a recommendation of spares and maintenance quantities.
- Section 3 - Equipment and Installation.
Equipment and Installation details shall be provided for all parts of the System including mechanical equipment, electrical power equipment, electronic equipment, communications equipment, computers, PC's and software. For each type of equipment, the following details shall be included:
 - a concise description of each item of equipment together with equipment specifications, modes of operation (including "operation under failure mode") and environmental parameters;
 - photographs;
 - detailed description of normal operation, testing operation for maintenance, and during start-up, shutdown and failure mode;

- procedures to be followed for fault diagnosis in the form of a chart with headings "fault", "possible cause" and "remedy" (trouble shooting guide);
- instructions for the dismantling, re-assembly, repair, testing and adjustment of equipment (including details of test equipment);
- fully labelled and complete circuit diagrams;
- manufacturer's name, nearest representative, address, email and telephone/facsimile numbers;
- comprehensive index of manufacturer's manuals referenced to equipment type and number;
- details of routine and planned maintenance procedures over the equipment life cycle;
- sufficient detailed information to enable the ordering of any spare part from the manufacturer's parts list.

- Section 4 – Configuration.

The installed system configuration shall be documented including as a minimum:

- an equipment schedule detailing all equipment supplied by location, make, model and serial number;
- details of the installed configuration or settings for each item of equipment;
- software versions and configurations supplied and installation details (including minimum requirements of the operating system and hardware).

This shall be provided in a Superintendent approved electronic format.

- Section 5 - Testing and Acceptance Reports.

Copies of the Test and Acceptance Report shall be included complete with all test records and certificates having signatures with dates and legible printed names.

Test and Acceptance Reports shall provide both recorded test results and the acceptable test values or ranges of values. Results outside of the acceptable values or ranges shall have explanatory notes and a signed copy of the Superintendent's acknowledgement signature.

Chart recordings and the like shall come complete with the test equipment serial number, recording date and time and the Superintendent's acknowledgement signature. Photocopies shall be supplied where original light sensitive or instrument thermal paper is used and where information may fade with time.

- Section 6 - Guarantees and Warranties.

Details of all equipment warranties shall be included together with the procedure to be followed in the event of a warranty claim.

- Section 7 - As-Constructed/Reference Drawings.

All "As Constructed" and manufacturer's reference drawings shall be included in the manuals and shall include general arrangement drawings, electronic system block diagram(s), power supply system schematics, electronic circuit schematics, printed circuit board layouts, terminal block layouts and enlarged views of mechanical components and assemblies. In addition to a print of each drawing, the following shall also be provided:

- CD ROM of all "As Constructed" and reference drawings in a format to be approved by the Superintendent, and
- Colour A3 size hard copies of all "As Constructed" and reference drawings.

During construction, installation, testing and commissioning the Contractor/Vendor shall maintain a copy of the drawings. These shall be marked in a neat and legible fashion identifying any corrections or changes. Marking shall be with a fine red waterproof pen. These drawings shall be made available to the Superintendent for information and copying. When commissioning is complete, these drawings shall be signed and dated as true and accurate records of the installation. Copies shall be provided to the Superintendent within five (5) working days of completion of the commissioning. The Contractor/Vendor shall use these markup drawings for electronically updating the "As Constructed" drawings.

- Section 8 - Calculations/Reference Data.

Copies of all calculations and reference data documented in accordance with AS/NZ ISO 9001:2000.

- Section 9 - Software Documentation.

Software documentation shall be separately bound and complete with hard covers. All software listings shall be fully annotated and arranged in a logical sequence. Soft documentation shall include but not necessarily be limited to the following:

- Software documentation shall be submitted on CD ROM in a format, which is approved by the Superintendent.

- Section 10 - Maintenance Schedules.

Maintenance schedules shall be separately bound, complete with hard covers. The volume shall include consolidated operator and technical maintenance schedules, maintenance procedures and maintenance logs. The logs shall be a proforma type to allow reproduction.

11.0 Recommended Spare Parts

A schedule of recommended spare parts necessary to maintain and operate the systems for a period of 24 months and any critical parts needed for maintenance shall be provided. The schedule shall identify each spare part with manufacturer and part numbers, pricing, availability.

A Recommended Spares List Schedule pro-forma is in Appendix A Recommended Spares List.

Appendix A Recommended Spares List

Table 8 Recommended Spares List

[illegible]

Appendix B Tunnel Lighting Design

Design Parameters of the Tunnel Lighting System

The tunnel lighting system shall comply with the requirements of AS/NZS1158.5 (2007).

The tunnel lighting design shall be of a symmetrical type installation as defined in the standard.

The arrangement of the luminaires and lamps shall allow for six (6) normal switched levels. Six (6) levels are provided to satisfy day and night lighting requirements depending on seasonal and weather influences.

An additional un-switched level is provided to meet emergency and security requirements.

The design parameters of the tunnel lighting system shall be as follows:

- Road surface CIE R1 (Concrete)
- Wall reflectance 0.60
- Concrete barrier reflectance 0.35
- Ceiling reflectance 0.3
- Maintenance factor 0.74
- Design maximum speed 90km / h
- Safe stopping distance 140metres (at 90km / h)
- Traffic flow Single way
- Zone lengths and luminance As per AS/NZS1158.5 (2007)
- Luminaire optical mounting height At ceiling level
- Tunnel width across 14.8 metres
- K Factor (AS1158) 0.0867

Table 9 Luminance Values

		Acton East Portal	Acton West Portal
L20 value West portal	(cd / m2)	4852	5115
Threshold value	(cd / m2)	421	444

Switching Levels of the Tunnel Lighting System

The tunnel lighting system switching sequence shall occur in accordance with the varying luminance levels detected in the access zone by the photometers at each tunnel portal. Each luminaire in the tunnel is assigned a fitting type which dictates the lighting level at which the luminaire shall be switched ON and OFF.

The lighting levels correspond to various percentages of overall lighting output:

Table 10 Fitting Types Operation for each Tunnel Switching Level

Light Level	Lth Level	CCT 1	CCT 2	CCT 3	CCT 4	CCT 5	CCT F	CCT E
100%	Level 1	ON	ON	ON	ON	ON	ON	ON
75%	Level 2	ON	ON	ON	ON		ON	ON
50%	Level 3	ON	ON		ON		ON	ON
25%	Level 4		ON		ON		ON	ON
12.50%	Level 5				ON		ON	ON
Night	Level 6						ON	ON
Emergency / Security								ON

Table 11 Switching Level for ACTON Tunnel - Western Bound

Switching Level	Design Luminance (cd/m ²)	Max. Access Zone Luminance (cd/m ²)	Switch UP to level when: (cd/m ²)	Switch DOWN to level when: (cd/m ²)
Level 1	444	5115	> 3836	N/A
Level 2	333	3836	>2558	< 3069 for 10 mins or more
Level 3	222	2558	> 1279	< 2046 for 10 mins or more
Level 4	111	1279	> 640	< 1023 for 10 mins or more
Level 5	56	640	> 320	< 512 for 10 mins or more
Level 6	4.6	320	N/A Refer section 4.3.8	< 256 for 10 mins or more

Table 12 Switching Level for ACTON Tunnel - Eastern Bound

Switching Level	Design Luminance (cd/m ²)	Max. Access Zone Luminance (cd/m ²)	Switch UP to level when: (cd/m ²)	Switch DOWN to level when: (cd/m ²)
Level 1	421	4852	> 3639	N/A
Level 2	316	3639	> 2426	< 2912 for 10 mins or more
Level 3	211	2426	> 1213	< 1941 for 10 mins or more
Level 4	105	1213	> 607	< 970 for 10 mins or more
Level 5	53	607	> 303	< 486 for 10 mins or more
Level 6	4.6	303	N/A Refer section 4.3.8	< 242 for 10 mins or more

The maximum Access Zone Luminance (AZL) is the average luminance outside the portal, monitored by the pair of photometers and is for a maximum vehicle speed limit of 90 kilometres per hour.

The tunnel lighting control system shall switch upward when the AZL is more than the maximum AZL of the current level. The tunnel lighting control system shall switch downward when the AZL is lower than 80% of the maximum AZL of the next level for a period of ten (10) minutes or more.

Appendix C Luminaire Switching Schedule

LUMINAIRE	DISTRIBUTION BOARD	CIRCUIT	LAMP	NOTE	SWITCH ZONE
East-bound 1					
EB1001EM	DB-EL	EB1-EM	58 W		
EB1002	DB-A(E)	EB1-1	58 W		
EB1003	DB-A(E)	EB1-1	58 W		
EB1004	DB-A(E)	EB1-1	58 W		
EB1005	DB-A(E)	EB1-1	58 W		
EB1006	DB-A(E)	EB1-1	58 W		
EB1007	DB-A(E)	EB1-1	58 W		
EB1008	DB-A(E)	EB1-1	58 W		
EB1009EM	DB-EL	EB1-EM	58 W		
EB1010	DB-A(E)	EB1-1	58 W		
EB1011	DB-A(E)	EB1-1	58 W		
EB1012	DB-A(E)	EB1-1	58 W		
EB1013	DB-A(E)	EB1-1	58 W		
EB1014	DB-A(E)	EB1-1	58 W		
EB1015	DB-A(E)	EB1-1	58 W		
EB1016	DB-A(E)	EB1-1	58 W		
EB1017EM	DB-EL	EB1-EM	58 W		
EB1018	DB-A(E)	EB1-1	58 W		
EB1019	DB-A(E)	EB1-1	58 W		
EB1020	DB-A(E)	EB1-1	58 W		
EB1021	DB-A(E)	EB1-1	58 W		
EB1022	DB-A(E)	EB1-1	58 W		
EB1023	DB-A(E)	EB1-1	58 W		
EB1024	DB-A(E)	EB1-1	58 W		
EB1025EM	DB-EL	EB1-EM	58 W		
EB1026	DB-A(E)	EB1-1	58 W		
EB1027	DB-A(E)	EB1-1	58 W		
EB1028	DB-A(E)	EB1-1	58 W		
EB1029	DB-A(E)	EB1-1	58 W		
EB1030	DB-A(E)	EB1-1	58 W		
EB1031	DB-A(E)	EB1-1	58 W		
EB1032EM	DB-A(E)	EB1-EM	58 W		
East-bound 2					
EB2-001	DB-B(E)	EB2-1-R	400 W		100%
EB2-002	DB-B(E)	EB2-2-R	400 W		100%
EB2-003	DB-G(W)	EB2-3-R	400 W		100%
EB2-004	DB-G(W)	EB2-4-R	400 W		100%
EB2-005	DB-G(W)	EB2-5-R	400 W		100%
EB2-006	DB-B(E)	EB2-1-W	400 W		100%
EB2-007	DB-B(E)	EB2-2-W	400 W		100%
EB2-008	DB-G(W)	EB2-3-W	400 W		100%
EB2-009	DB-G(W)	EB2-4-W	400 W		100%
EB2-010	DB-G(W)	EB2-5-W	400 W		100%
EB2-011	DB-B(E)	EB2-1-B	400 W		100%

LUMINAIRE	DISTRIBUTION BOARD	CIRCUIT	LAMP	NOTE	SWITCH ZONE
EB2-012	DB-B(E)	EB2-2-B	400 W		100%
EB2-013	DB-G(W)	EB2-3-B	400 W		100%
EB2-014	DB-G(W)	EB2-4-B	400 W		100%
EB2-015	DB-G(W)	EB2-5-B	400 W		100%
EB2-016	DB-B(E)	EB2-1-R	400 W		100%
EB2-017	DB-B(E)	EB2-2-R	400 W		100%
EB2-018	DB-G(W)	EB2-3-R	400 W		100%
EB2-019	DB-G(W)	EB2-4-R	400 W		100%
EB2-020	DB-G(W)	EB2-5-R	400 W		100%
EB2-021	DB-B(E)	EB2-1-W	400 W		100%
EB2-022	DB-B(E)	EB2-2-W	400 W		100%
EB2-023	DB-G(W)	EB2-3-W	400 W		100%
EB2-024	DB-G(W)	EB2-4-W	400 W		100%
EB2-025	DB-G(W)	EB2-5-W	400 W		100%
EB2-026	DB-B(E)	EB2-1-B	400 W		100%
EB2-027	DB-B(E)	EB2-2-B	400 W		100%
EB2-028	DB-G(W)	EB2-3-B	400 W		100%
EB2-029	DB-G(W)	EB2-4-B	400 W		100%
EB2-030	DB-G(W)	EB2-5-B	400 W		100%
EB2-031	DB-B(E)	EB2-1-R	400 W		100%
EB2-032	DB-B(E)	EB2-2-R	400 W		100%
EB2-033	DB-G(W)	EB2-3-R	400 W		100%
EB2-034	DB-G(W)	EB2-4-R	400 W		100%
EB2-035	DB-G(W)	EB2-5-R	400 W		100%
EB2-036	DB-B(E)	EB2-1-W	400 W		100%
EB2-037	DB-B(E)	EB2-2-W	400 W		100%
EB2-038	DB-G(W)	EB2-3-W	400 W		100%
EB2-039	DB-G(W)	EB2-4-W	400 W		100%
EB2-040	DB-G(W)	EB2-5-W	400 W		100%
EB2-041	DB-B(E)	EB2-1-B	400 W		100%
EB2-042	DB-B(E)	EB2-2-B	400 W		100%
EB2-043	DB-G(W)	EB2-3-B	400 W		100%
EB2-044	DB-G(W)	EB2-4-B	400 W		100%
EB2-045	DB-G(W)	EB2-5-B	400 W		100%
EB2-046	DB-B(E)	EB2-1-R	400 W		100%
EB2-047	DB-B(E)	EB2-2-R	400 W		100%
EB2-048	DB-G(W)	EB2-3-R	400 W		100%
EB2-049	DB-G(W)	EB2-4-R	400 W		100%
EB2-050	DB-G(W)	EB2-5-R	400 W		100%
EB2-051	DB-B(E)	EB2-1-W	400 W		100%
EB2-052	DB-B(E)	EB2-2-W	400 W		100%
EB2-053	DB-G(W)	EB2-3-W	400 W		100%
EB2-054	DB-G(W)	EB2-4-W	400 W		100%
EB2-055	DB-G(W)	EB2-5-W	400 W		100%
EB2-056	DB-B(E)	EB2-1-B	400 W		100%
EB2-057	DB-B(E)	EB2-2-B	400 W		100%
EB2-058	DB-G(W)	EB2-3-B	400 W		100%
EB2-059	DB-G(W)	EB2-4-B	400 W		100%
EB2-060	DB-G(W)	EB2-5-B	400 W		100%
EB2-061	DB-B(E)	EB2-1-R	400 W		100%

LUMINAIRE	DISTRIBUTION BOARD	CIRCUIT	LAMP	NOTE	SWITCH ZONE
EB2-062	DB-B(E)	EB2-2-R	400 W		100%
EB2-063	DB-G(W)	EB2-3-R	400 W		100%
EB2-064	DB-G(W)	EB2-4-R	400 W		100%
EB2-065	DB-G(W)	EB2-5-R	400 W		100%
EB2-066	DB-B(E)	EB2-1-W	400 W		100%
EB2-067	DB-B(E)	EB2-2-W	400 W		100%
EB2-068	DB-G(W)	EB2-3-W	400 W		100%
EB2-069	DB-G(W)	EB2-4-W	400 W		100%
EB2-070	DB-G(W)	EB2-5-W	400 W		100%
EB2-071	DB-B(E)	EB2-1-B	400 W		100%
EB2-072	DB-B(E)	EB2-2-B	400 W		100%
EB2-073	DB-G(W)	EB2-3-B	400 W		100%
EB2-074	DB-G(W)	EB2-4-B	400 W		100%
EB2-075	DB-G(W)	EB2-5-B	400 W		100%
EB2-076	DB-B(E)	EB2-1-R	400 W		100%
EB2-077	DB-B(E)	EB2-2-R	400 W		100%
EB2-078	DB-G(W)	EB2-3-R	400 W		100%
EB2-079	DB-G(W)	EB2-4-R	400 W		100%
EB2-080	DB-G(W)	EB2-5-R	400 W		100%
EB2-081	DB-B(E)	EB2-1-W	400 W		100%
EB2-082	DB-B(E)	EB2-2-W	400 W		100%
EB2-083	DB-G(W)	EB2-3-W	400 W		100%
EB2-084	DB-G(W)	EB2-4-W	400 W		100%
EB2-085	DB-G(W)	EB2-5-W	400 W		100%
EB2-086	DB-B(E)	EB2-1-B	400 W		100%
EB2-087	DB-B(E)	EB2-2-B	400 W		100%
EB2-088	DB-G(W)	EB2-3-B	400 W		100%
EB2-089	DB-G(W)	EB2-4-B	400 W		100%
EB2-090	DB-G(W)	EB2-5-B	400 W		100%
EB2-091	DB-B(E)	EB2-1-R	400 W		100%
EB2-092	DB-B(E)	EB2-2-R	400 W		100%
EB2-093	DB-G(W)	EB2-3-R	400 W		100%
EB2-094	DB-G(W)	EB2-4-R	400 W		100%
EB2-095	DB-G(W)	EB2-5-R	400 W		100%
EB2-096	DB-B(E)	EB2-1-W	400 W		100%
EB2-097	DB-B(E)	EB2-2-W	400 W		100%
EB2-098	DB-G(W)	EB2-3-W	400 W		100%
EB2-099	DB-G(W)	EB2-4-W	400 W		100%
EB2-100	DB-G(W)	EB2-5-W	400 W		100%
EB2-101	DB-B(E)	EB2-1-B	400 W		100%
EB2-102	DB-B(E)	EB2-2-B	400 W		100%
EB2-103	DB-G(W)	EB2-3-B	400 W		100%
EB2-104	DB-G(W)	EB2-4-B	400 W		100%
EB2-105	DB-G(W)	EB2-5-B	400 W		100%
EB2-106	DB-B(E)	EB2-1-R	400 W		100%
EB2-107	DB-B(E)	EB2-2-R	400 W		100%
EB2-108	DB-G(W)	EB2-3-R	400 W		100%
EB2-109	DB-G(W)	EB2-4-R	400 W		100%
EB2-110	DB-G(W)	EB2-5-R	400 W		100%
EB2-111	DB-B(E)	EB2-1-W	400 W		100%

LUMINAIRE	DISTRIBUTION BOARD	CIRCUIT	LAMP	NOTE	SWITCH ZONE
EB2-112	DB-B(E)	EB2-2-W	400 W		100%
EB2-113	DB-G(W)	EB2-3-W	400 W		100%
EB2-114	DB-G(W)	EB2-4-W	400 W		100%
EB2-115	DB-G(W)	EB2-5-W	400 W		100%
EB2-116	DB-B(E)	EB2-1-B	400 W		100%
EB2-117	DB-B(E)	EB2-2-B	400 W		100%
EB2-118	DB-G(W)	EB2-3-B	400 W		100%
EB2-119	DB-G(W)	EB2-4-B	400 W		75%
EB2-120	DB-G(W)	EB2-5-B	400 W		75%
EB2-121	DB-B(E)	EB2-1-R	400 W		75%
EB2-122	DB-B(E)	EB2-2-R	400 W		75%
EB2-123	DB-G(W)	EB2-3-R	400 W		75%
EB2-124	DB-G(W)	EB2-4-R	400 W		75%
EB2-125	DB-G(W)	EB2-5-R	400 W		75%
EB2-126	DB-B(E)	EB2-1-W	400 W		75%
EB2-127	DB-B(E)	EB2-2-W	400 W		75%
EB2-128	DB-G(W)	EB2-3-W	400 W		75%
EB2-129	DB-G(W)	EB2-4-W	400 W		75%
EB2-130	DB-G(W)	EB2-5-W	400 W		75%
EB2-131	DB-B(E)	EB2-1-B	400 W		75%
EB2-132	DB-B(E)	EB2-2-B	400 W		75%
EB2-133	DB-G(W)	EB2-3-B	400 W		75%
EB2-134	DB-G(W)	EB2-4-B	400 W		75%
EB2-135	DB-G(W)	EB2-5-B	400 W		75%
EB2-136	DB-B(E)	EB2-1-R	400 W		75%
EB2-137	DB-B(E)	EB2-2-R	400 W		75%
EB2-138	DB-G(W)	EB2-3-R	400 W		75%
EB2-139	DB-G(W)	EB2-4-R	400 W		75%
EB2-140	DB-G(W)	EB2-5-R	400 W		75%
EB2-141	DB-B(E)	EB2-1-W	400 W		75%
EB2-142	DB-B(E)	EB2-2-W	400 W		75%
EB2-143	DB-G(W)	EB2-3-W	400 W		75%
EB2-144	DB-G(W)	EB2-4-W	400 W		75%
EB2-145	DB-G(W)	EB2-5-W	400 W		75%
EB2-146	DB-B(E)	EB2-1-B	400 W		75%
EB2-147	DB-B(E)	EB2-2-B	400 W		75%
EB2-148	DB-G(W)	EB2-3-B	400 W		75%
EB2-149	DB-G(W)	EB2-4-B	400 W		75%
EB2-150	DB-G(W)	EB2-5-B	400 W		75%
EB2-151	DB-B(E)	EB2-1-R	400 W		75%
EB2-152	DB-B(E)	EB2-2-R	400 W		75%
EB2-153	DB-G(W)	EB2-3-R	400 W		75%
EB2-154	DB-G(W)	EB2-4-R	400 W		75%
EB2-155	DB-G(W)	EB2-5-R	400 W		75%
EB2-156	DB-B(E)	EB2-1-W	400 W		75%
EB2-157	DB-B(E)	EB2-2-W	400 W		75%
EB2-158	DB-G(W)	EB2-3-W	400 W		75%
EB2-159	DB-G(W)	EB2-4-W	400 W		75%
EB2-160	DB-G(W)	EB2-5-W	400 W		75%
EB2-161	DB-B(E)	EB2-1-B	400 W		75%

LUMINAIRE	DISTRIBUTION BOARD	CIRCUIT	LAMP	NOTE	SWITCH ZONE
EB2-162	DB-B(E)	EB2-2-B	400 W		75%
EB2-163	DB-G(W)	EB2-3-B	400 W		50%
EB2-164	DB-G(W)	EB2-4-B	250 W		50%
EB2-165	DB-G(W)	EB2-5-B	400 W		50%
EB2-166	DB-B(E)	EB2-1-R	250 W		50%
EB2-167	DB-B(E)	EB2-2-R	400 W		50%
EB2-168	DB-G(W)	EB2-3-R	400 W		50%
EB2-169	DB-G(W)	EB2-4-R	250 W		50%
EB2-170	DB-G(W)	EB2-5-R	400 W		50%
EB2-171	DB-B(E)	EB2-1-W	250 W		50%
EB2-172	DB-B(E)	EB2-2-W	400 W		50%
EB2-173	DB-G(W)	EB2-3-W	400 W		50%
EB2-174	DB-G(W)	EB2-4-W	250 W		50%
EB2-175	DB-G(W)	EB2-5-W	400 W		50%
EB2-176	DB-B(E)	EB2-1-B	250 W		50%
EB2-177	DB-B(E)	EB2-2-B	400 W		50%
EB2-178	DB-G(W)	EB2-3-B	400 W		50%
EB2-179	DB-G(W)	EB2-4-B	250 W		50%
EB2-180	DB-G(W)	EB2-5-B	400 W		50%
EB2-181	DB-B(E)	EB2-1-R	150 W	(exception wattage)	50%
EB2-182	DB-B(E)	EB2-2-R	150 W	(exception wattage)	50%
EB2-183	DB-G(W)	EB2-3-R	250 W		25%
EB2-184	DB-G(W)	EB2-4-R	150 W		25%
EB2-185	DB-G(W)	EB2-5-R	400 W		25%
EB2-186	DB-B(E)	EB2-1-W	150 W		25%
EB2-187	DB-B(E)	EB2-2-W	250 W		25%
EB2-188	DB-G(W)	EB2-3-W	250 W		25%
EB2-189	DB-G(W)	EB2-4-W	150 W		25%
EB2-190	DB-G(W)	EB2-5-W	400 W		25%
EB2-191	DB-B(E)	EB2-1-B	150 W		25%
EB2-192	DB-B(E)	EB2-2-B	250 W		25%
EB2-193	DB-G(W)	EB2-3-B	250 W		25%
EB2-194	DB-G(W)	EB2-4-B	150 W		25%
EB2-195	DB-G(W)	EB2-5-B	400 W		25%
EB2-196	DB-B(E)	EB2-1-R	150 W		25%
EB2-197	DB-B(E)	EB2-2-R	250 W		25%
EB2-198	DB-G(W)	EB2-3-R	250 W		25%
EB2-199	DB-G(W)	EB2-4-R	150 W		25%
EB2-200	DB-G(W)	EB2-5-R	400 W		25%
EB2-201	DB-B(E)	EB2-1-W	150 W		25%
EB2-202	DB-B(E)	EB2-2-W	250 W		25%
EB2-203	DB-G(W)	EB2-3-W	250 W		25%
EB2-204	DB-G(W)	EB2-4-W	150 W		25%
EB2-205	DB-G(W)	EB2-5-W	400 W		25%
EB2-206	DB-B(E)	EB2-1-B	150 W		25%
EB2-207	DB-B(E)	EB2-2-B	250 W		25%
EB2-208	DB-G(W)	EB2-3-B	250 W		25%
EB2-209	DB-G(W)	EB2-4-B	150 W		25%
EB2-210	DB-G(W)	EB2-5-B	400 W		25%
EB2-211	DB-B(E)	EB2-1-R	150 W		25%

LUMINAIRE	DISTRIBUTION BOARD	CIRCUIT	LAMP	NOTE	SWITCH ZONE
EB2-212	DB-B(E)	EB2-2-R	250 W		25%
EB2-213	DB-G(W)	EB2-3-R	250 W		25%
EB2-214	DB-G(W)	EB2-4-R	150 W		12.5%
EB2-215	DB-G(W)	EB2-5-R	400 W		12.5%
EB2-216	DB-B(E)	EB2-1-W	150 W		12.5%
EB2-217	DB-B(E)	EB2-2-W	250 W		12.5%
EB2-218	DB-G(W)	EB2-3-W	250 W		12.5%
EB2-219	DB-G(W)	EB2-4-W	150 W		12.5%
EB2-220	DB-G(W)	EB2-5-W	400 W		12.5%
EB2-221	DB-B(E)	EB2-1-B	150 W		12.5%
EB2-222	DB-B(E)	EB2-2-B	250 W		12.5%
EB2-223	DB-G(W)	EB2-3-B	250 W		12.5%
EB2-224	DB-G(W)	EB2-4-B	150 W		12.5%
EB2-225	DB-G(W)	EB2-5-B	400 W		12.5%
East-bound 3					
EB3-001	DB-B(E)	EB3-1-R	400 W		100%
EB3-002	DB-B(E)	EB3-2-R	400 W		100%
EB3-003	DB-G(W)	EB3-3-R	400 W		100%
EB3-004	DB-G(W)	EB3-4-R	400 W		100%
EB3-005	DB-G(W)	EB3-5-R	400 W		100%
EB3-006	DB-B(E)	EB3-1-W	400 W		100%
EB3-007	DB-B(E)	EB3-2-W	400 W		100%
EB3-008	DB-G(W)	EB3-3-W	400 W		100%
EB3-009	DB-G(W)	EB3-4-W	400 W		100%
EB3-010	DB-G(W)	EB3-5-W	400 W		100%
EB3-011	DB-B(E)	EB3-1-B	400 W		100%
EB3-012	DB-B(E)	EB3-2-B	400 W		100%
EB3-013	DB-G(W)	EB3-3-B	400 W		100%
EB3-014	DB-G(W)	EB3-4-B	400 W		100%
EB3-015	DB-G(W)	EB3-5-B	400 W		100%
EB3-016	DB-B(E)	EB3-1-R	400 W		100%
EB3-017	DB-B(E)	EB3-2-R	400 W		100%
EB3-018	DB-G(W)	EB3-3-R	400 W		100%
EB3-019	DB-G(W)	EB3-4-R	400 W		100%
EB3-020	DB-G(W)	EB3-5-R	400 W		100%
EB3-021	DB-B(E)	EB3-1-W	400 W		100%
EB3-022	DB-B(E)	EB3-2-W	400 W		100%
EB3-023	DB-G(W)	EB3-3-W	400 W		100%
EB3-024	DB-G(W)	EB3-4-W	400 W		100%
EB3-025	DB-G(W)	EB3-5-W	400 W		100%
EB3-026	DB-B(E)	EB3-1-B	400 W		100%
EB3-027	DB-B(E)	EB3-2-B	400 W		100%
EB3-028	DB-G(W)	EB3-3-B	400 W		100%
EB3-029	DB-G(W)	EB3-4-B	400 W		100%
EB3-030	DB-G(W)	EB3-5-B	400 W		100%
EB3-031	DB-B(E)	EB3-1-R	400 W		100%
EB3-032	DB-B(E)	EB3-2-R	400 W		100%
EB3-033	DB-G(W)	EB3-3-R	400 W		100%
EB3-034	DB-G(W)	EB3-4-R	400 W		100%
EB3-035	DB-G(W)	EB3-5-R	400 W		100%

LUMINAIRE	DISTRIBUTION BOARD	CIRCUIT	LAMP	NOTE	SWITCH ZONE
EB3-036	DB-B(E)	EB3-1-W	400 W		100%
EB3-037	DB-B(E)	EB3-2-W	400 W		100%
EB3-038	DB-G(W)	EB3-3-W	400 W		100%
EB3-039	DB-G(W)	EB3-4-W	400 W		100%
EB3-040	DB-G(W)	EB3-5-W	400 W		100%
EB3-041	DB-B(E)	EB3-1-B	400 W		100%
EB3-042	DB-B(E)	EB3-2-B	400 W		100%
EB3-043	DB-G(W)	EB3-3-B	400 W		100%
EB3-044	DB-G(W)	EB3-4-B	400 W		100%
EB3-045	DB-G(W)	EB3-5-B	400 W		100%
EB3-046	DB-B(E)	EB3-1-R	400 W		100%
EB3-047	DB-B(E)	EB3-2-R	400 W		100%
EB3-048	DB-G(W)	EB3-3-R	400 W		100%
EB3-049	DB-G(W)	EB3-4-R	400 W		100%
EB3-050	DB-G(W)	EB3-5-R	400 W		100%
EB3-051	DB-B(E)	EB3-1-W	400 W		100%
EB3-052	DB-B(E)	EB3-2-W	400 W		100%
EB3-053	DB-G(W)	EB3-3-W	400 W		100%
EB3-054	DB-G(W)	EB3-4-W	400 W		100%
EB3-055	DB-G(W)	EB3-5-W	400 W		100%
EB3-056	DB-B(E)	EB3-1-B	400 W		100%
EB3-057	DB-B(E)	EB3-2-B	400 W		100%
EB3-058	DB-G(W)	EB3-3-B	400 W		100%
EB3-059	DB-G(W)	EB3-4-B	400 W		100%
EB3-060	DB-G(W)	EB3-5-B	400 W		100%
EB3-061	DB-B(E)	EB3-1-R	400 W		100%
EB3-062	DB-B(E)	EB3-2-R	400 W		100%
EB3-063	DB-G(W)	EB3-3-R	400 W		100%
EB3-064	DB-G(W)	EB3-4-R	400 W		100%
EB3-065	DB-G(W)	EB3-5-R	400 W		100%
EB3-066	DB-B(E)	EB3-1-W	400 W		100%
EB3-067	DB-B(E)	EB3-2-W	400 W		100%
EB3-068	DB-G(W)	EB3-3-W	400 W		100%
EB3-069	DB-G(W)	EB3-4-W	400 W		100%
EB3-070	DB-G(W)	EB3-5-W	400 W		100%
EB3-071	DB-B(E)	EB3-1-B	400 W		100%
EB3-072	DB-B(E)	EB3-2-B	400 W		100%
EB3-073	DB-G(W)	EB3-3-B	400 W		100%
EB3-074	DB-G(W)	EB3-4-B	400 W		100%
EB3-075	DB-G(W)	EB3-5-B	400 W		100%
EB3-076	DB-B(E)	EB3-1-R	400 W		100%
EB3-077	DB-B(E)	EB3-2-R	400 W		100%
EB3-078	DB-G(W)	EB3-3-R	400 W		100%
EB3-079	DB-G(W)	EB3-4-R	400 W		100%
EB3-080	DB-G(W)	EB3-5-R	400 W		100%
EB3-081	DB-B(E)	EB3-1-W	400 W		100%
EB3-082	DB-B(E)	EB3-2-W	400 W		100%
EB3-083	DB-G(W)	EB3-3-W	400 W		100%
EB3-084	DB-G(W)	EB3-4-W	400 W		100%
EB3-085	DB-G(W)	EB3-5-W	400 W		100%

LUMINAIRE	DISTRIBUTION BOARD	CIRCUIT	LAMP	NOTE	SWITCH ZONE
EB3-086	DB-B(E)	EB3-1-B	400 W		100%
EB3-087	DB-B(E)	EB3-2-B	400 W		100%
EB3-088	DB-G(W)	EB3-3-B	400 W		100%
EB3-089	DB-G(W)	EB3-4-B	400 W		100%
EB3-090	DB-G(W)	EB3-5-B	400 W		100%
EB3-091	DB-B(E)	EB3-1-R	400 W		100%
EB3-092	DB-B(E)	EB3-2-R	400 W		100%
EB3-093	DB-G(W)	EB3-3-R	400 W		100%
EB3-094	DB-G(W)	EB3-4-R	400 W		100%
EB3-095	DB-G(W)	EB3-5-R	400 W		100%
EB3-096	DB-B(E)	EB3-1-W	400 W		100%
EB3-097	DB-B(E)	EB3-2-W	400 W		100%
EB3-098	DB-G(W)	EB3-3-W	400 W		100%
EB3-099	DB-G(W)	EB3-4-W	400 W		100%
EB3-100	DB-G(W)	EB3-5-W	400 W		100%
EB3-101	DB-B(E)	EB3-1-B	400 W		100%
EB3-102	DB-B(E)	EB3-2-B	400 W		100%
EB3-103	DB-G(W)	EB3-3-B	400 W		100%
EB3-104	DB-G(W)	EB3-4-B	400 W		100%
EB3-105	DB-G(W)	EB3-5-B	400 W		100%
EB3-106	DB-B(E)	EB3-1-R	400 W		100%
EB3-107	DB-B(E)	EB3-2-R	400 W		100%
EB3-108	DB-G(W)	EB3-3-R	400 W		100%
EB3-109	DB-G(W)	EB3-4-R	400 W		100%
EB3-110	DB-G(W)	EB3-5-R	400 W		100%
EB3-111	DB-B(E)	EB3-1-W	400 W		100%
EB3-112	DB-B(E)	EB3-2-W	400 W		100%
EB3-113	DB-G(W)	EB3-3-W	400 W		100%
EB3-114	DB-G(W)	EB3-4-W	400 W		100%
EB3-115	DB-G(W)	EB3-5-W	400 W		100%
EB3-116	DB-B(E)	EB3-1-B	400 W		100%
EB3-117	DB-B(E)	EB3-2-B	400 W		100%
EB3-118	DB-G(W)	EB3-3-B	400 W		100%
EB3-119	DB-G(W)	EB3-4-B	400 W		75%
EB3-120	DB-G(W)	EB3-5-B	400 W		75%
EB3-121	DB-B(E)	EB3-1-R	400 W		75%
EB3-122	DB-B(E)	EB3-2-R	400 W		75%
EB3-123	DB-G(W)	EB3-3-R	400 W		75%
EB3-124	DB-G(W)	EB3-4-R	400 W		75%
EB3-125	DB-G(W)	EB3-5-R	400 W		75%
EB3-126	DB-B(E)	EB3-1-W	400 W		75%
EB3-127	DB-B(E)	EB3-2-W	400 W		75%
EB3-128	DB-G(W)	EB3-3-W	400 W		75%
EB3-129	DB-G(W)	EB3-4-W	400 W		75%
EB3-130	DB-G(W)	EB3-5-W	400 W		75%
EB3-131	DB-B(E)	EB3-1-B	400 W		75%
EB3-132	DB-B(E)	EB3-2-B	400 W		75%
EB3-133	DB-G(W)	EB3-3-B	400 W		75%
EB3-134	DB-G(W)	EB3-4-B	400 W		75%
EB3-135	DB-G(W)	EB3-5-B	400 W		75%

LUMINAIRE	DISTRIBUTION BOARD	CIRCUIT	LAMP	NOTE	SWITCH ZONE
EB3-136	DB-B(E)	EB3-1-R	400 W		75%
EB3-137	DB-B(E)	EB3-2-R	400 W		75%
EB3-138	DB-G(W)	EB3-3-R	400 W		75%
EB3-139	DB-G(W)	EB3-4-R	400 W		75%
EB3-140	DB-G(W)	EB3-5-R	400 W		75%
EB3-141	DB-B(E)	EB3-1-W	400 W		75%
EB3-142	DB-B(E)	EB3-2-W	400 W		75%
EB3-143	DB-G(W)	EB3-3-W	400 W		75%
EB3-144	DB-G(W)	EB3-4-W	400 W		75%
EB3-145	DB-G(W)	EB3-5-W	400 W		75%
EB3-146	DB-B(E)	EB3-1-B	400 W		75%
EB3-147	DB-B(E)	EB3-2-B	400 W		75%
EB3-148	DB-G(W)	EB3-3-B	400 W		75%
EB3-149	DB-G(W)	EB3-4-B	400 W		75%
EB3-150	DB-G(W)	EB3-5-B	400 W		75%
EB3-151	DB-B(E)	EB3-1-R	400 W		75%
EB3-152	DB-B(E)	EB3-2-R	400 W		75%
EB3-153	DB-G(W)	EB3-3-R	400 W		75%
EB3-154	DB-G(W)	EB3-4-R	400 W		75%
EB3-155	DB-G(W)	EB3-5-R	400 W		75%
EB3-156	DB-B(E)	EB3-1-W	400 W		75%
EB3-157	DB-B(E)	EB3-2-W	400 W		75%
EB3-158	DB-G(W)	EB3-3-W	400 W		75%
EB3-159	DB-G(W)	EB3-4-W	400 W		75%
EB3-160	DB-G(W)	EB3-5-W	400 W		75%
EB3-161	DB-B(E)	EB3-1-B	400 W		75%
EB3-162	DB-B(E)	EB3-2-B	400 W		75%
EB3-163	DB-G(W)	EB3-3-B	400 W		50%
EB3-164	DB-G(W)	EB3-4-B	250 W		50%
EB3-165	DB-G(W)	EB3-5-B	400 W		50%
EB3-166	DB-B(E)	EB3-1-R	250 W		50%
EB3-167	DB-B(E)	EB3-2-R	400 W		50%
EB3-168	DB-G(W)	EB3-3-R	400 W		50%
EB3-169	DB-G(W)	EB3-4-R	250 W		50%
EB3-170	DB-G(W)	EB3-5-R	400 W		50%
EB3-171	DB-B(E)	EB3-1-W	250 W		50%
EB3-172	DB-B(E)	EB3-2-W	400 W		50%
EB3-173	DB-G(W)	EB3-3-W	400 W		50%
EB3-174	DB-G(W)	EB3-4-W	250 W		50%
EB3-175	DB-G(W)	EB3-5-W	400 W		50%
EB3-176	DB-B(E)	EB3-1-B	250 W		50%
EB3-177	DB-B(E)	EB3-2-B	400 W		50%
EB3-178	DB-G(W)	EB3-3-B	400 W		50%
EB3-179	DB-G(W)	EB3-4-B	250 W		50%
EB3-180	DB-G(W)	EB3-5-B	400 W		50%
EB3-181	DB-B(E)	EB3-1-R	150 W	(exception wattage)	50%
EB3-182	DB-B(E)	EB3-2-R	150 W	(exception wattage)	50%
EB3-183	DB-G(W)	EB3-3-R	250 W		25%
EB3-184	DB-G(W)	EB3-4-R	150 W		25%
EB3-185	DB-G(W)	EB3-5-R	400 W		25%

LUMINAIRE	DISTRIBUTION BOARD	CIRCUIT	LAMP	NOTE	SWITCH ZONE
EB3-186	DB-B(E)	EB3-1-W	150 W		25%
EB3-187	DB-B(E)	EB3-2-W	250 W		25%
EB3-188	DB-G(W)	EB3-3-W	250 W		25%
EB3-189	DB-G(W)	EB3-4-W	150 W		25%
EB3-190	DB-G(W)	EB3-5-W	400 W		25%
EB3-191	DB-B(E)	EB3-1-B	150 W		25%
EB3-192	DB-B(E)	EB3-2-B	250 W		25%
EB3-193	DB-G(W)	EB3-3-B	250 W		25%
EB3-194	DB-G(W)	EB3-4-B	150 W		25%
EB3-195	DB-G(W)	EB3-5-B	400 W		25%
EB3-196	DB-B(E)	EB3-1-R	150 W		25%
EB3-197	DB-B(E)	EB3-2-R	250 W		25%
EB3-198	DB-G(W)	EB3-3-R	250 W		25%
EB3-199	DB-G(W)	EB3-4-R	150 W		25%
EB3-200	DB-G(W)	EB3-5-R	400 W		25%
EB3-201	DB-B(E)	EB3-1-W	150 W		25%
EB3-202	DB-B(E)	EB3-2-W	250 W		25%
EB3-203	DB-G(W)	EB3-3-W	250 W		25%
EB3-204	DB-G(W)	EB3-4-W	150 W		25%
EB3-205	DB-G(W)	EB3-5-W	400 W		25%
EB3-206	DB-B(E)	EB3-1-B	150 W		25%
EB3-207	DB-B(E)	EB3-2-B	250 W		25%
EB3-208	DB-G(W)	EB3-3-B	250 W		25%
EB3-209	DB-G(W)	EB3-4-B	150 W		25%
EB3-210	DB-G(W)	EB3-5-B	400 W		25%
EB3-211	DB-B(E)	EB3-1-R	150 W		25%
EB3-212	DB-B(E)	EB3-2-R	250 W		25%
EB3-213	DB-G(W)	EB3-3-R	250 W		25%
EB3-214	DB-G(W)	EB3-4-R	150 W		12.5%
EB3-215	DB-G(W)	EB3-5-R	400 W		12.5%
EB3-216	DB-B(E)	EB3-1-W	150 W		12.5%
EB3-217	DB-B(E)	EB3-2-W	250 W		12.5%
EB3-218	DB-G(W)	EB3-3-W	250 W		12.5%
EB3-219	DB-G(W)	EB3-4-W	150 W		12.5%
EB3-220	DB-G(W)	EB3-5-W	400 W		12.5%
EB3-221	DB-B(E)	EB3-1-B	150 W		12.5%
EB3-222	DB-B(E)	EB3-2-B	250 W		12.5%
EB3-223	DB-G(W)	EB3-3-B	250 W		12.5%
EB3-224	DB-G(W)	EB3-4-B	150 W		12.5%
EB3-225	DB-G(W)	EB3-5-B	400 W		12.5%
East-bound					
4					
EB4-001EM	DB-EL	EB4-EM	58 W		
EB4-002	DB-E(E)	EB4-1	58 W		
EB4-003	DB-E(E)	EB4-1	58 W		
EB4-004	DB-E(E)	EB4-1	58 W		
EB4-005EM	DB-EL	EB4-EM	58 W		
EB4-006	DB-E(E)	EB4-1	58 W		
EB4-007	DB-E(E)	EB4-1	58 W		
EB4-008	DB-E(E)	EB4-1	58 W		
EB4-009	DB-E(E)	EB4-1	58 W		

LUMINAIRE	DISTRIBUTION BOARD	CIRCUIT	LAMP	NOTE	SWITCH ZONE
EB4-010	DB-E(E)	EB4-1	58 W		
EB4-011	DB-E(E)	EB4-1	58 W		
EB4-012	DB-E(E)	EB4-1	58 W		
EB4-013EM	DB-EL	EB4-EM	58 W		
EB4-014	DB-E(E)	EB4-1	58 W		
EB4-015	DB-E(E)	EB4-1	58 W		
EB4-016	DB-E(E)	EB4-1	58 W		
EB4-017	DB-E(E)	EB4-1	58 W		
EB4-018	DB-E(E)	EB4-1	58 W		
EB4-019	DB-E(E)	EB4-1	58 W		
EB4-020	DB-E(E)	EB4-1	58 W		
EB4-021EM	DB-EL	EB4-EM	58 W		
EB4-022	DB-E(E)	EB4-1	58 W		
EB4-023	DB-E(E)	EB4-1	58 W		
EB4-024	DB-E(E)	EB4-1	58 W		
EB4-025	DB-E(E)	EB4-1	58 W		
EB4-026	DB-E(E)	EB4-1	58 W		
EB4-027	DB-E(E)	EB4-1	58 W		
EB4-028	DB-E(E)	EB4-1	58 W		
EB4-029EM	DB-EL	EB4-EM	58 W		
EB4-030	DB-E(E)	EB4-1	58 W		
EB4-031	DB-E(E)	EB4-1	58 W		
EB4-032EM	DB-E(E)	EB4-EM	58 W		
West-bound 1					
WB1-001EM	DB-A(W)L	WB1-EM	58 W		
WB1-002	DB-A(W)	WB1-1	58 W		
WB1-003	DB-A(W)	WB1-1	58 W		
WB1-004	DB-A(W)	WB1-1	58 W		
WB1-005	DB-A(W)	WB1-1	58 W		
WB1-006	DB-A(W)	WB1-1	58 W		
WB1-007	DB-A(W)	WB1-1	58 W		
WB1-008	DB-A(W)	WB1-1	58 W		
WB1-009EM	DB-A(W)L	WB1-EM	58 W		
WB1-010	DB-A(W)	WB1-1	58 W		
WB1-011	DB-A(W)	WB1-1	58 W		
WB1-012	DB-A(W)	WB1-1	58 W		
WB1-013	DB-A(W)	WB1-1	58 W		
WB1-014	DB-A(W)	WB1-1	58 W		
WB1-015	DB-A(W)	WB1-1	58 W		
WB1-016	DB-A(W)	WB1-1	58 W		
WB1-017EM	DB-A(W)L	WB1-EM	58 W		
WB1-018	DB-A(W)	WB1-1	58 W		
WB1-019	DB-A(W)	WB1-1	58 W		
WB1-020	DB-A(W)	WB1-1	58 W		
WB1-021	DB-A(W)	WB1-1	58 W		
WB1-022	DB-A(W)	WB1-1	58 W		
WB1-023	DB-A(W)	WB1-1	58 W		
WB1-024	DB-A(W)	WB1-1	58 W		
WB1-025EM	DB-A(W)L	WB1-EM	58 W		
WB1-026	DB-A(W)	WB1-1	58 W		

LUMINAIRE	DISTRIBUTION BOARD	CIRCUIT	LAMP	NOTE	SWITCH ZONE
WB1-027	DB-A(W)	WB1-1	58 W		
WB1-028	DB-A(W)	WB1-1	58 W		
WB1-029	DB-A(W)	WB1-1	58 W		
WB1-030	DB-A(W)	WB1-1	58 W		
WB1-031	DB-A(W)	WB1-1	58 W		
WB1-032	DB-A(W)	WB1-1	58 W		
WB1-033EM	DB-A(W)L	WB1-EM	58 W		
West-bound 2					
WB2-001	DB-F(W)	WB2-1-R	400 W		100%
WB2-002	DB-F(W)	WB2-2-R	400 W		100%
WB2-003	DB-C(E)	WB2-3-R	400 W		100%
WB2-004	DB-C(E)	WB2-4-R	400 W		100%
WB2-005	DB-C(E)	WB2-5-R	400 W		100%
WB2-006	DB-F(W)	WB2-1-W	400 W		100%
WB2-007	DB-F(W)	WB2-2-W	400 W		100%
WB2-008	DB-C(E)	WB2-3-W	400 W		100%
WB2-009	DB-C(E)	WB2-4-W	400 W		100%
WB2-010	DB-C(E)	WB2-5-W	400 W		100%
WB2-011	DB-F(W)	WB2-1-B	400 W		100%
WB2-012	DB-F(W)	WB2-2-B	400 W		100%
WB2-013	DB-C(E)	WB2-3-B	400 W		100%
WB2-014	DB-C(E)	WB2-4-B	400 W		100%
WB2-015	DB-C(E)	WB2-5-B	400 W		100%
WB2-016	DB-F(W)	WB2-1-R	400 W		100%
WB2-017	DB-F(W)	WB2-2-R	400 W		100%
WB2-018	DB-C(E)	WB2-3-R	400 W		100%
WB2-019	DB-C(E)	WB2-4-R	400 W		100%
WB2-020	DB-C(E)	WB2-5-R	400 W		100%
WB2-021	DB-F(W)	WB2-1-W	400 W		100%
WB2-022	DB-F(W)	WB2-2-W	400 W		100%
WB2-023	DB-C(E)	WB2-3-W	400 W		100%
WB2-024	DB-C(E)	WB2-4-W	400 W		100%
WB2-025	DB-C(E)	WB2-5-W	400 W		100%
WB2-026	DB-F(W)	WB2-1-B	400 W		100%
WB2-027	DB-F(W)	WB2-2-B	400 W		100%
WB2-028	DB-C(E)	WB2-3-B	400 W		100%
WB2-029	DB-C(E)	WB2-4-B	400 W		100%
WB2-030	DB-C(E)	WB2-5-B	400 W		100%
WB2-031	DB-F(W)	WB2-1-R	400 W		100%
WB2-032	DB-F(W)	WB2-2-R	400 W		100%
WB2-033	DB-C(E)	WB2-3-R	400 W		100%
WB2-034	DB-C(E)	WB2-4-R	400 W		100%
WB2-035	DB-C(E)	WB2-5-R	400 W		100%
WB2-036	DB-F(W)	WB2-1-W	400 W		100%
WB2-037	DB-F(W)	WB2-2-W	400 W		100%
WB2-038	DB-C(E)	WB2-3-W	400 W		100%
WB2-039	DB-C(E)	WB2-4-W	400 W		100%
WB2-040	DB-C(E)	WB2-5-W	400 W		100%
WB2-041	DB-F(W)	WB2-1-B	400 W		100%
WB2-042	DB-F(W)	WB2-2-B	400 W		100%

LUMINAIRE	DISTRIBUTION BOARD	CIRCUIT	LAMP	NOTE	SWITCH ZONE
WB2-043	DB-C(E)	WB2-3-B	400 W		100%
WB2-044	DB-C(E)	WB2-4-B	400 W		100%
WB2-045	DB-C(E)	WB2-5-B	400 W		100%
WB2-046	DB-F(W)	WB2-1-R	400 W		100%
WB2-047	DB-F(W)	WB2-2-R	400 W		100%
WB2-048	DB-C(E)	WB2-3-R	400 W		100%
WB2-049	DB-C(E)	WB2-4-R	400 W		100%
WB2-050	DB-C(E)	WB2-5-R	400 W		100%
WB2-051	DB-F(W)	WB2-1-W	400 W		100%
WB2-052	DB-F(W)	WB2-2-W	400 W		100%
WB2-053	DB-C(E)	WB2-3-W	400 W		100%
WB2-054	DB-C(E)	WB2-4-W	400 W		100%
WB2-055	DB-C(E)	WB2-5-W	400 W		100%
WB2-056	DB-F(W)	WB2-1-B	400 W		100%
WB2-057	DB-F(W)	WB2-2-B	400 W		100%
WB2-058	DB-C(E)	WB2-3-B	400 W		100%
WB2-059	DB-C(E)	WB2-4-B	400 W		100%
WB2-060	DB-C(E)	WB2-5-B	400 W		100%
WB2-061	DB-F(W)	WB2-1-R	400 W		100%
WB2-062	DB-F(W)	WB2-2-R	400 W		100%
WB2-063	DB-C(E)	WB2-3-R	400 W		100%
WB2-064	DB-C(E)	WB2-4-R	400 W		100%
WB2-065	DB-C(E)	WB2-5-R	400 W		100%
WB2-066	DB-F(W)	WB2-1-W	400 W		100%
WB2-067	DB-F(W)	WB2-2-W	400 W		100%
WB2-068	DB-C(E)	WB2-3-W	400 W		100%
WB2-069	DB-C(E)	WB2-4-W	400 W		100%
WB2-070	DB-C(E)	WB2-5-W	400 W		100%
WB2-071	DB-F(W)	WB2-1-B	400 W		100%
WB2-072	DB-F(W)	WB2-2-B	400 W		100%
WB2-073	DB-C(E)	WB2-3-B	400 W		100%
WB2-074	DB-C(E)	WB2-4-B	400 W		100%
WB2-075	DB-C(E)	WB2-5-B	400 W		100%
WB2-076	DB-F(W)	WB2-1-R	400 W		100%
WB2-077	DB-F(W)	WB2-2-R	400 W		100%
WB2-078	DB-C(E)	WB2-3-R	400 W		100%
WB2-079	DB-C(E)	WB2-4-R	400 W		100%
WB2-080	DB-C(E)	WB2-5-R	400 W		100%
WB2-081	DB-F(W)	WB2-1-W	400 W		100%
WB2-082	DB-F(W)	WB2-2-W	400 W		100%
WB2-083	DB-C(E)	WB2-3-W	400 W		100%
WB2-084	DB-C(E)	WB2-4-W	400 W		100%
WB2-085	DB-C(E)	WB2-5-W	400 W		100%
WB2-086	DB-F(W)	WB2-1-B	400 W		100%
WB2-087	DB-F(W)	WB2-2-B	400 W		100%
WB2-088	DB-C(E)	WB2-3-B	400 W		100%
WB2-089	DB-C(E)	WB2-4-B	400 W		100%
WB2-090	DB-C(E)	WB2-5-B	400 W		100%
WB2-091	DB-F(W)	WB2-1-R	400 W		100%
WB2-092	DB-F(W)	WB2-2-R	400 W		100%

LUMINAIRE	DISTRIBUTION BOARD	CIRCUIT	LAMP	NOTE	SWITCH ZONE
WB2-093	DB-C(E)	WB2-3-R	400 W		100%
WB2-094	DB-C(E)	WB2-4-R	400 W		100%
WB2-095	DB-C(E)	WB2-5-R	400 W		100%
WB2-096	DB-F(W)	WB2-1-W	400 W		100%
WB2-097	DB-F(W)	WB2-2-W	400 W		100%
WB2-098	DB-C(E)	WB2-3-W	400 W		100%
WB2-099	DB-C(E)	WB2-4-W	400 W		100%
WB2-100	DB-C(E)	WB2-5-W	400 W		100%
WB2-101	DB-F(W)	WB2-1-B	400 W		100%
WB2-102	DB-F(W)	WB2-2-B	400 W		100%
WB2-103	DB-C(E)	WB2-3-B	400 W		100%
WB2-104	DB-C(E)	WB2-4-B	400 W		100%
WB2-105	DB-C(E)	WB2-5-B	400 W		100%
WB2-106	DB-F(W)	WB2-1-R	400 W		100%
WB2-107	DB-F(W)	WB2-2-R	400 W		100%
WB2-108	DB-C(E)	WB2-3-R	400 W		100%
WB2-109	DB-C(E)	WB2-4-R	400 W		100%
WB2-110	DB-C(E)	WB2-5-R	400 W		100%
WB2-111	DB-F(W)	WB2-1-W	400 W		100%
WB2-112	DB-F(W)	WB2-2-W	400 W		100%
WB2-113	DB-C(E)	WB2-3-W	400 W		100%
WB2-114	DB-C(E)	WB2-4-W	400 W		100%
WB2-115	DB-C(E)	WB2-5-W	400 W		100%
WB2-116	DB-F(W)	WB2-1-B	400 W		100%
WB2-117	DB-F(W)	WB2-2-B	400 W		100%
WB2-118	DB-C(E)	WB2-3-B	400 W		100%
WB2-119	DB-C(E)	WB2-4-B	400 W		75%
WB2-120	DB-C(E)	WB2-5-B	400 W		75%
WB2-121	DB-F(W)	WB2-1-R	400 W		75%
WB2-122	DB-F(W)	WB2-2-R	400 W		75%
WB2-123	DB-C(E)	WB2-3-R	400 W		75%
WB2-124	DB-C(E)	WB2-4-R	400 W		75%
WB2-125	DB-C(E)	WB2-5-R	400 W		75%
WB2-126	DB-F(W)	WB2-1-W	400 W		75%
WB2-127	DB-F(W)	WB2-2-W	400 W		75%
WB2-128	DB-C(E)	WB2-3-W	400 W		75%
WB2-129	DB-C(E)	WB2-4-W	400 W		75%
WB2-130	DB-C(E)	WB2-5-W	400 W		75%
WB2-131	DB-F(W)	WB2-1-B	400 W		75%
WB2-132	DB-F(W)	WB2-2-B	400 W		75%
WB2-133	DB-C(E)	WB2-3-B	400 W		75%
WB2-134	DB-C(E)	WB2-4-B	400 W		75%
WB2-135	DB-C(E)	WB2-5-B	400 W		75%
WB2-136	DB-F(W)	WB2-1-R	400 W		75%
WB2-137	DB-F(W)	WB2-2-R	400 W		75%
WB2-138	DB-C(E)	WB2-3-R	400 W		75%
WB2-139	DB-C(E)	WB2-4-R	400 W		75%
WB2-140	DB-C(E)	WB2-5-R	400 W		75%
WB2-141	DB-F(W)	WB2-1-W	400 W		75%
WB2-142	DB-F(W)	WB2-2-W	400 W		75%

LUMINAIRE	DISTRIBUTION BOARD	CIRCUIT	LAMP	NOTE	SWITCH ZONE
WB2-143	DB-C(E)	WB2-3-W	400 W		75%
WB2-144	DB-C(E)	WB2-4-W	400 W		75%
WB2-145	DB-C(E)	WB2-5-W	400 W		75%
WB2-146	DB-F(W)	WB2-1-B	400 W		75%
WB2-147	DB-F(W)	WB2-2-B	400 W		75%
WB2-148	DB-C(E)	WB2-3-B	400 W		75%
WB2-149	DB-C(E)	WB2-4-B	400 W		75%
WB2-150	DB-C(E)	WB2-5-B	400 W		75%
WB2-151	DB-F(W)	WB2-1-R	400 W		75%
WB2-152	DB-F(W)	WB2-2-R	400 W		75%
WB2-153	DB-C(E)	WB2-3-R	400 W		75%
WB2-154	DB-C(E)	WB2-4-R	400 W		75%
WB2-155	DB-C(E)	WB2-5-R	400 W		75%
WB2-156	DB-F(W)	WB2-1-W	400 W		75%
WB2-157	DB-F(W)	WB2-2-W	400 W		75%
WB2-158	DB-C(E)	WB2-3-W	400 W		75%
WB2-159	DB-C(E)	WB2-4-W	400 W		75%
WB2-160	DB-C(E)	WB2-5-W	400 W		75%
WB2-161	DB-F(W)	WB2-1-B	400 W		75%
WB2-162	DB-F(W)	WB2-2-B	400 W		75%
WB2-163	DB-C(E)	WB2-3-B	400 W		50%
WB2-164	DB-C(E)	WB2-4-B	250 W		50%
WB2-165	DB-C(E)	WB2-5-B	400 W		50%
WB2-166	DB-F(W)	WB2-1-R	250 W		50%
WB2-167	DB-F(W)	WB2-2-R	400 W		50%
WB2-168	DB-C(E)	WB2-3-R	400 W		50%
WB2-169	DB-C(E)	WB2-4-R	250 W		50%
WB2-170	DB-C(E)	WB2-5-R	400 W		50%
WB2-171	DB-F(W)	WB2-1-W	250 W		50%
WB2-172	DB-F(W)	WB2-2-W	400 W		50%
WB2-173	DB-C(E)	WB2-3-W	400 W		50%
WB2-174	DB-C(E)	WB2-4-W	250 W		50%
WB2-175	DB-C(E)	WB2-5-W	400 W		50%
WB2-176	DB-F(W)	WB2-1-B	250 W		50%
WB2-177	DB-F(W)	WB2-2-B	400 W		50%
WB2-178	DB-C(E)	WB2-3-B	400 W		50%
WB2-179	DB-C(E)	WB2-4-B	250 W		50%
WB2-180	DB-C(E)	WB2-5-B	400 W		50%
WB2-181	DB-F(W)	WB2-1-R	150 W	(exception wattage)	50%
WB2-182	DB-F(W)	WB2-2-R	150 W	(exception wattage)	50%
WB2-183	DB-C(E)	WB2-3-R	250 W		25%
WB2-184	DB-C(E)	WB2-4-R	150 W		25%
WB2-185	DB-C(E)	WB2-5-R	400 W		25%
WB2-186	DB-F(W)	WB2-1-W	150 W		25%
WB2-187	DB-F(W)	WB2-2-W	250 W		25%
WB2-188	DB-C(E)	WB2-3-W	250 W		25%
WB2-189	DB-C(E)	WB2-4-W	150 W		25%
WB2-190	DB-C(E)	WB2-5-W	400 W		25%
WB2-191	DB-F(W)	WB2-1-B	150 W		25%
WB2-192	DB-F(W)	WB2-2-B	250 W		25%

LUMINAIRE	DISTRIBUTION BOARD	CIRCUIT	LAMP	NOTE	SWITCH ZONE
WB2-193	DB-C(E)	WB2-3-B	250 W		25%
WB2-194	DB-C(E)	WB2-4-B	150 W		25%
WB2-195	DB-C(E)	WB2-5-B	400 W		25%
WB2-196	DB-F(W)	WB2-1-R	150 W		25%
WB2-197	DB-F(W)	WB2-2-R	250 W		25%
WB2-198	DB-C(E)	WB2-3-R	250 W		25%
WB2-199	DB-C(E)	WB2-4-R	150 W		25%
WB2-200	DB-C(E)	WB2-5-R	400 W		25%
WB2-201	DB-F(W)	WB2-1-W	150 W		25%
WB2-202	DB-F(W)	WB2-2-W	250 W		25%
WB2-203	DB-C(E)	WB2-3-W	250 W		25%
WB2-204	DB-C(E)	WB2-4-W	150 W		25%
WB2-205	DB-C(E)	WB2-5-W	400 W		25%
WB2-206	DB-F(W)	WB2-1-B	150 W		25%
WB2-207	DB-F(W)	WB2-2-B	250 W		25%
WB2-208	DB-C(E)	WB2-3-B	250 W		25%
WB2-209	DB-C(E)	WB2-4-B	150 W		25%
WB2-210	DB-C(E)	WB2-5-B	400 W		25%
WB2-211	DB-F(W)	WB2-1-R	150 W		25%
WB2-212	DB-F(W)	WB2-2-R	250 W		25%
WB2-213	DB-C(E)	WB2-3-R	250 W		25%
WB2-214	DB-C(E)	WB2-4-R	150 W		12.5%
WB2-215	DB-C(E)	WB2-5-R	400 W		12.5%
WB2-216	DB-F(W)	WB2-1-W	150 W		12.5%
WB2-217	DB-F(W)	WB2-2-W	250 W		12.5%
WB2-218	DB-C(E)	WB2-3-W	250 W		12.5%
WB2-219	DB-C(E)	WB2-4-W	150 W		12.5%
WB2-220	DB-C(E)	WB2-5-W	400 W		12.5%
WB2-221	DB-F(W)	WB2-1-B	150 W		12.5%
WB2-222	DB-F(W)	WB2-2-B	250 W		12.5%
WB2-223	DB-C(E)	WB2-3-B	250 W		12.5%
WB2-224	DB-C(E)	WB2-4-B	150 W		12.5%
WB2-225	DB-C(E)	WB2-5-B	400 W		12.5%
WB2-226	DB-F(W)	WB2-1-R	150 W	alternate phase & CCT#	12.5%
WB2-227	DB-F(W)	WB2-2-W	250 W	alternate phase & CCT#	12.5%
WB2-228	DB-C(E)	WB2-3-B	250 W	alternate phase & CCT#	12.5%
West-bound					
3					
WB3-001	DB-F(W)	WB3-1-R	400 W		100%
WB3-002	DB-F(W)	WB3-2-R	400 W		100%
WB3-003	DB-C(E)	WB3-3-R	400 W		100%
WB3-004	DB-C(E)	WB3-4-R	400 W		100%
WB3-005	DB-C(E)	WB3-5-R	400 W		100%
WB3-006	DB-F(W)	WB3-1-W	400 W		100%
WB3-007	DB-F(W)	WB3-2-W	400 W		100%
WB3-008	DB-C(E)	WB3-3-W	400 W		100%
WB3-009	DB-C(E)	WB3-4-W	400 W		100%
WB3-010	DB-C(E)	WB3-5-W	400 W		100%
WB3-011	DB-F(W)	WB3-1-B	400 W		100%
WB3-012	DB-F(W)	WB3-2-B	400 W		100%
WB3-013	DB-C(E)	WB3-3-B	400 W		100%

LUMINAIRE	DISTRIBUTION BOARD	CIRCUIT	LAMP	NOTE	SWITCH ZONE
WB3-014	DB-C(E)	WB3-4-B	400 W		100%
WB3-015	DB-C(E)	WB3-5-B	400 W		100%
WB3-016	DB-F(W)	WB3-1-R	400 W		100%
WB3-017	DB-F(W)	WB3-2-R	400 W		100%
WB3-018	DB-C(E)	WB3-3-R	400 W		100%
WB3-019	DB-C(E)	WB3-4-R	400 W		100%
WB3-020	DB-C(E)	WB3-5-R	400 W		100%
WB3-021	DB-F(W)	WB3-1-W	400 W		100%
WB3-022	DB-F(W)	WB3-2-W	400 W		100%
WB3-023	DB-C(E)	WB3-3-W	400 W		100%
WB3-024	DB-C(E)	WB3-4-W	400 W		100%
WB3-025	DB-C(E)	WB3-5-W	400 W		100%
WB3-026	DB-F(W)	WB3-1-B	400 W		100%
WB3-027	DB-F(W)	WB3-2-B	400 W		100%
WB3-028	DB-C(E)	WB3-3-B	400 W		100%
WB3-029	DB-C(E)	WB3-4-B	400 W		100%
WB3-030	DB-C(E)	WB3-5-B	400 W		100%
WB3-031	DB-F(W)	WB3-1-R	400 W		100%
WB3-032	DB-F(W)	WB3-2-R	400 W		100%
WB3-033	DB-C(E)	WB3-3-R	400 W		100%
WB3-034	DB-C(E)	WB3-4-R	400 W		100%
WB3-035	DB-C(E)	WB3-5-R	400 W		100%
WB3-036	DB-F(W)	WB3-1-W	400 W		100%
WB3-037	DB-F(W)	WB3-2-W	400 W		100%
WB3-038	DB-C(E)	WB3-3-W	400 W		100%
WB3-039	DB-C(E)	WB3-4-W	400 W		100%
WB3-040	DB-C(E)	WB3-5-W	400 W		100%
WB3-041	DB-F(W)	WB3-1-B	400 W		100%
WB3-042	DB-F(W)	WB3-2-B	400 W		100%
WB3-043	DB-C(E)	WB3-3-B	400 W		100%
WB3-044	DB-C(E)	WB3-4-B	400 W		100%
WB3-045	DB-C(E)	WB3-5-B	400 W		100%
WB3-046	DB-F(W)	WB3-1-R	400 W		100%
WB3-047	DB-F(W)	WB3-2-R	400 W		100%
WB3-048	DB-C(E)	WB3-3-R	400 W		100%
WB3-049	DB-C(E)	WB3-4-R	400 W		100%
WB3-050	DB-C(E)	WB3-5-R	400 W		100%
WB3-051	DB-F(W)	WB3-1-W	400 W		100%
WB3-052	DB-F(W)	WB3-2-W	400 W		100%
WB3-053	DB-C(E)	WB3-3-W	400 W		100%
WB3-054	DB-C(E)	WB3-4-W	400 W		100%
WB3-055	DB-C(E)	WB3-5-W	400 W		100%
WB3-056	DB-F(W)	WB3-1-B	400 W		100%
WB3-057	DB-F(W)	WB3-2-B	400 W		100%
WB3-058	DB-C(E)	WB3-3-B	400 W		100%
WB3-059	DB-C(E)	WB3-4-B	400 W		100%
WB3-060	DB-C(E)	WB3-5-B	400 W		100%
WB3-061	DB-F(W)	WB3-1-R	400 W		100%
WB3-062	DB-F(W)	WB3-2-R	400 W		100%
WB3-063	DB-C(E)	WB3-3-R	400 W		100%

LUMINAIRE	DISTRIBUTION BOARD	CIRCUIT	LAMP	NOTE	SWITCH ZONE
WB3-064	DB-C(E)	WB3-4-R	400 W		100%
WB3-065	DB-C(E)	WB3-5-R	400 W		100%
WB3-066	DB-F(W)	WB3-1-W	400 W		100%
WB3-067	DB-F(W)	WB3-2-W	400 W		100%
WB3-068	DB-C(E)	WB3-3-W	400 W		100%
WB3-069	DB-C(E)	WB3-4-W	400 W		100%
WB3-070	DB-C(E)	WB3-5-W	400 W		100%
WB3-071	DB-F(W)	WB3-1-B	400 W		100%
WB3-072	DB-F(W)	WB3-2-B	400 W		100%
WB3-073	DB-C(E)	WB3-3-B	400 W		100%
WB3-074	DB-C(E)	WB3-4-B	400 W		100%
WB3-075	DB-C(E)	WB3-5-B	400 W		100%
WB3-076	DB-F(W)	WB3-1-R	400 W		100%
WB3-077	DB-F(W)	WB3-2-R	400 W		100%
WB3-078	DB-C(E)	WB3-3-R	400 W		100%
WB3-079	DB-C(E)	WB3-4-R	400 W		100%
WB3-080	DB-C(E)	WB3-5-R	400 W		100%
WB3-081	DB-F(W)	WB3-1-W	400 W		100%
WB3-082	DB-F(W)	WB3-2-W	400 W		100%
WB3-083	DB-C(E)	WB3-3-W	400 W		100%
WB3-084	DB-C(E)	WB3-4-W	400 W		100%
WB3-085	DB-C(E)	WB3-5-W	400 W		100%
WB3-086	DB-F(W)	WB3-1-B	400 W		100%
WB3-087	DB-F(W)	WB3-2-B	400 W		100%
WB3-088	DB-C(E)	WB3-3-B	400 W		100%
WB3-089	DB-C(E)	WB3-4-B	400 W		100%
WB3-090	DB-C(E)	WB3-5-B	400 W		100%
WB3-091	DB-F(W)	WB3-1-R	400 W		100%
WB3-092	DB-F(W)	WB3-2-R	400 W		100%
WB3-093	DB-C(E)	WB3-3-R	400 W		100%
WB3-094	DB-C(E)	WB3-4-R	400 W		100%
WB3-095	DB-C(E)	WB3-5-R	400 W		100%
WB3-096	DB-F(W)	WB3-1-W	400 W		100%
WB3-097	DB-F(W)	WB3-2-W	400 W		100%
WB3-098	DB-C(E)	WB3-3-W	400 W		100%
WB3-099	DB-C(E)	WB3-4-W	400 W		100%
WB3-100	DB-C(E)	WB3-5-W	400 W		100%
WB3-101	DB-F(W)	WB3-1-B	400 W		100%
WB3-102	DB-F(W)	WB3-2-B	400 W		100%
WB3-103	DB-C(E)	WB3-3-B	400 W		100%
WB3-104	DB-C(E)	WB3-4-B	400 W		100%
WB3-105	DB-C(E)	WB3-5-B	400 W		100%
WB3-106	DB-F(W)	WB3-1-R	400 W		100%
WB3-107	DB-F(W)	WB3-2-R	400 W		100%
WB3-108	DB-C(E)	WB3-3-R	400 W		100%
WB3-109	DB-C(E)	WB3-4-R	400 W		100%
WB3-110	DB-C(E)	WB3-5-R	400 W		100%
WB3-111	DB-F(W)	WB3-1-W	400 W		100%
WB3-112	DB-F(W)	WB3-2-W	400 W		100%
WB3-113	DB-C(E)	WB3-3-W	400 W		100%

LUMINAIRE	DISTRIBUTION BOARD	CIRCUIT	LAMP	NOTE	SWITCH ZONE
WB3-114	DB-C(E)	WB3-4-W	400 W		100%
WB3-115	DB-C(E)	WB3-5-W	400 W		100%
WB3-116	DB-F(W)	WB3-1-B	400 W		100%
WB3-117	DB-F(W)	WB3-2-B	400 W		100%
WB3-118	DB-C(E)	WB3-3-B	400 W		100%
WB3-119	DB-C(E)	WB3-4-B	400 W		75%
WB3-120	DB-C(E)	WB3-5-B	400 W		75%
WB3-121	DB-F(W)	WB3-1-R	400 W		75%
WB3-122	DB-F(W)	WB3-2-R	400 W		75%
WB3-123	DB-C(E)	WB3-3-R	400 W		75%
WB3-124	DB-C(E)	WB3-4-R	400 W		75%
WB3-125	DB-C(E)	WB3-5-R	400 W		75%
WB3-126	DB-F(W)	WB3-1-W	400 W		75%
WB3-127	DB-F(W)	WB3-2-W	400 W		75%
WB3-128	DB-C(E)	WB3-3-W	400 W		75%
WB3-129	DB-C(E)	WB3-4-W	400 W		75%
WB3-130	DB-C(E)	WB3-5-W	400 W		75%
WB3-131	DB-F(W)	WB3-1-B	400 W		75%
WB3-132	DB-F(W)	WB3-2-B	400 W		75%
WB3-133	DB-C(E)	WB3-3-B	400 W		75%
WB3-134	DB-C(E)	WB3-4-B	400 W		75%
WB3-135	DB-C(E)	WB3-5-B	400 W		75%
WB3-136	DB-F(W)	WB3-1-R	400 W		75%
WB3-137	DB-F(W)	WB3-2-R	400 W		75%
WB3-138	DB-C(E)	WB3-3-R	400 W		75%
WB3-139	DB-C(E)	WB3-4-R	400 W		75%
WB3-140	DB-C(E)	WB3-5-R	400 W		75%
WB3-141	DB-F(W)	WB3-1-W	400 W		75%
WB3-142	DB-F(W)	WB3-2-W	400 W		75%
WB3-143	DB-C(E)	WB3-3-W	400 W		75%
WB3-144	DB-C(E)	WB3-4-W	400 W		75%
WB3-145	DB-C(E)	WB3-5-W	400 W		75%
WB3-146	DB-F(W)	WB3-1-B	400 W		75%
WB3-147	DB-F(W)	WB3-2-B	400 W		75%
WB3-148	DB-C(E)	WB3-3-B	400 W		75%
WB3-149	DB-C(E)	WB3-4-B	400 W		75%
WB3-150	DB-C(E)	WB3-5-B	400 W		75%
WB3-151	DB-F(W)	WB3-1-R	400 W		75%
WB3-152	DB-F(W)	WB3-2-R	400 W		75%
WB3-153	DB-C(E)	WB3-3-R	400 W		75%
WB3-154	DB-C(E)	WB3-4-R	400 W		75%
WB3-155	DB-C(E)	WB3-5-R	400 W		75%
WB3-156	DB-F(W)	WB3-1-W	400 W		75%
WB3-157	DB-F(W)	WB3-2-W	400 W		75%
WB3-158	DB-C(E)	WB3-3-W	400 W		75%
WB3-159	DB-C(E)	WB3-4-W	400 W		75%
WB3-160	DB-C(E)	WB3-5-W	400 W		75%
WB3-161	DB-F(W)	WB3-1-B	400 W		75%
WB3-162	DB-F(W)	WB3-2-B	400 W		75%
WB3-163	DB-C(E)	WB3-3-B	400 W		50%

LUMINAIRE	DISTRIBUTION BOARD	CIRCUIT	LAMP	NOTE	SWITCH ZONE
WB3-164	DB-C(E)	WB3-4-B	250 W		50%
WB3-165	DB-C(E)	WB3-5-B	400 W		50%
WB3-166	DB-F(W)	WB3-1-R	250 W		50%
WB3-167	DB-F(W)	WB3-2-R	400 W		50%
WB3-168	DB-C(E)	WB3-3-R	400 W		50%
WB3-169	DB-C(E)	WB3-4-R	250 W		50%
WB3-170	DB-C(E)	WB3-5-R	400 W		50%
WB3-171	DB-F(W)	WB3-1-W	250 W		50%
WB3-172	DB-F(W)	WB3-2-W	400 W		50%
WB3-173	DB-C(E)	WB3-3-W	400 W		50%
WB3-174	DB-C(E)	WB3-4-W	250 W		50%
WB3-175	DB-C(E)	WB3-5-W	400 W		50%
WB3-176	DB-F(W)	WB3-1-B	250 W		50%
WB3-177	DB-F(W)	WB3-2-B	400 W		50%
WB3-178	DB-C(E)	WB3-3-B	400 W		50%
WB3-179	DB-C(E)	WB3-4-B	250 W		50%
WB3-180	DB-C(E)	WB3-5-B	400 W		50%
WB3-181	DB-F(W)	WB3-1-R	150 W	(exception wattage)	50%
WB3-182	DB-F(W)	WB3-2-R	150 W	(exception wattage)	50%
WB3-183	DB-C(E)	WB3-3-R	250 W		25%
WB3-184	DB-C(E)	WB3-4-R	150 W		25%
WB3-185	DB-C(E)	WB3-5-R	400 W		25%
WB3-186	DB-F(W)	WB3-1-W	150 W		25%
WB3-187	DB-F(W)	WB3-2-W	250 W		25%
WB3-188	DB-C(E)	WB3-3-W	250 W		25%
WB3-189	DB-C(E)	WB3-4-W	150 W		25%
WB3-190	DB-C(E)	WB3-5-W	400 W		25%
WB3-191	DB-F(W)	WB3-1-B	150 W		25%
WB3-192	DB-F(W)	WB3-2-B	250 W		25%
WB3-193	DB-C(E)	WB3-3-B	250 W		25%
WB3-194	DB-C(E)	WB3-4-B	150 W		25%
WB3-195	DB-C(E)	WB3-5-B	400 W		25%
WB3-196	DB-F(W)	WB3-1-R	150 W		25%
WB3-197	DB-F(W)	WB3-2-R	250 W		25%
WB3-198	DB-C(E)	WB3-3-R	250 W		25%
WB3-199	DB-C(E)	WB3-4-R	150 W		25%
WB3-200	DB-C(E)	WB3-5-R	400 W		25%
WB3-201	DB-F(W)	WB3-1-W	150 W		25%
WB3-202	DB-F(W)	WB3-2-W	250 W		25%
WB3-203	DB-C(E)	WB3-3-W	250 W		25%
WB3-204	DB-C(E)	WB3-4-W	150 W		25%
WB3-205	DB-C(E)	WB3-5-W	400 W		25%
WB3-206	DB-F(W)	WB3-1-B	150 W		25%
WB3-207	DB-F(W)	WB3-2-B	250 W		25%
WB3-208	DB-C(E)	WB3-3-B	250 W		25%
WB3-209	DB-C(E)	WB3-4-B	150 W		25%
WB3-210	DB-C(E)	WB3-5-B	400 W		25%
WB3-211	DB-F(W)	WB3-1-R	150 W		25%
WB3-212	DB-F(W)	WB3-2-R	250 W		25%
WB3-213	DB-C(E)	WB3-3-R	250 W		25%

LUMINAIRE	DISTRIBUTION BOARD	CIRCUIT	LAMP	NOTE	SWITCH ZONE
WB3-214	DB-C(E)	WB3-4-R	150 W		12.5%
WB3-215	DB-C(E)	WB3-5-R	400 W		12.5%
WB3-216	DB-F(W)	WB3-1-W	150 W		12.5%
WB3-217	DB-F(W)	WB3-2-W	250 W		12.5%
WB3-218	DB-C(E)	WB3-3-W	250 W		12.5%
WB3-219	DB-C(E)	WB3-4-W	150 W		12.5%
WB3-220	DB-C(E)	WB3-5-W	400 W		12.5%
WB3-221	DB-F(W)	WB3-1-B	150 W		12.5%
WB3-222	DB-F(W)	WB3-2-B	250 W		12.5%
WB3-223	DB-C(E)	WB3-3-B	250 W		12.5%
WB3-224	DB-C(E)	WB3-4-B	150 W		12.5%
WB3-225	DB-C(E)	WB3-5-B	400 W		12.5%
WB3-226	DB-F(W)	WB3-1-R	150 W	alternate phase & CCT#	12.5%
WB3-227	DB-F(W)	WB3-2-W	250 W	alternate phase & CCT#	12.5%
WB3-228	DB-C(E)	WB3-3-B	250 W	alternate phase & CCT#	12.5%
West-bound 4					
WB4-001EM	DB-EL	WB4-EM	58 W		
WB4-002	DB-E(W)	WB1-1	58 W		
WB4-003	DB-E(W)	WB1-1	58 W		
WB4-004	DB-E(W)	WB1-1	58 W		
WB4-005EM	DB-EL	WB4-EM	58 W		
WB4-006	DB-E(W)	WB1-1	58 W		
WB4-007	DB-E(W)	WB1-1	58 W		
WB4-008	DB-E(W)	WB1-1	58 W		
WB4-009	DB-E(W)	WB1-1	58 W		
WB4-010	DB-E(W)	WB1-1	58 W		
WB4-011	DB-E(W)	WB1-1	58 W		
WB4-012	DB-E(W)	WB1-1	58 W		
WB4-013EM	DB-EL	WB4-EM	58 W		
WB4-014	DB-E(W)	WB1-1	58 W		
WB4-015	DB-E(W)	WB1-1	58 W		
WB4-016	DB-E(W)	WB1-1	58 W		
WB4-017	DB-E(W)	WB1-1	58 W		
WB4-018	DB-E(W)	WB1-1	58 W		
WB4-019	DB-E(W)	WB1-1	58 W		
WB4-020	DB-E(W)	WB1-1	58 W		
WB4-021EM	DB-EL	WB4-EM	58 W		
WB4-022	DB-E(W)	WB1-1	58 W		
WB4-023	DB-E(W)	WB1-1	58 W		
WB4-024	DB-E(W)	WB1-1	58 W		
WB4-025	DB-E(W)	WB1-1	58 W		
WB4-026	DB-E(W)	WB1-1	58 W		
WB4-027	DB-E(W)	WB1-1	58 W		
WB4-028	DB-E(W)	WB1-1	58 W		
WB4-029EM	DB-EL	WB4-EM	58 W		
WB4-030	DB-E(W)	WB1-1	58 W		
WB4-031	DB-E(W)	WB1-1	58 W		
WB4-032	DB-E(W)	WB1-1	58 W		
WB4-033EM	DB-E(W)	WB4-EM	58 W		

