

VENUE CYMRU

LVC-CBL-SLAV-PSP-001

(Llandudno, Wales, UK)

Performance
Specification –
Stagelighting
and Audiovisual
systems

TENDER
November 2025

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PREFACE

TENDER INFORMATION

This document - the Stagelighting and Audiovisual Systems Performance Specification - provides the detailed specification for each element of the works as well as the specification of the scope of works, design preliminaries and standards of execution.

For pricing purposes, this document must be read in conjunction with the Stagelighting and Audiovisual Systems Equipment Schedule (LVC-CBL-SLAV-EQS-002 Equipment Schedule) which is also available in MS Excel™ format to assist with pricing calculations.

HOW TO CROSS-REFERENCE INFORMATION FOR PRICING PURPOSES

Each element of the works is assigned a reference number as defined at the head of section 2.0 of this document.

The Equipment Schedule (LVC-CBL-SLAV-EQS-002-Equipment schedule) must be referred to for the bill of quantities for each reference and thereby used to price each element. The equipment schedule must be returned with individual pricing, sub-totals and overall totals correctly completed as part of the specialist contractor's bid.

Note: It is the specialist contractor's responsibility to ensure that all pricing sub-totals and totals are correct; do not rely on spread sheet software alone for this function.

This Performance Specification document provides a description and specification of each element including information on how the element co-ordinates with the overall building design and any further co-ordination issues which are required to be resolved as part of the specialist contractor's design process.

The level of system design is to propose intent only - further design developments will be required prior to the contractor completing the detailed design & specifications.

PRICING

Installation work must be itemised separately, where indicated on the Equipment Schedule.

Submitted prices must be inclusive of costs for all shipping to the job site as well as all duties and taxes.

Tenders are to include allowances for all meeting attendances and all travel, relocation and/or per diem costs to be incurred during the performance of the work and supporting activities.

The cost of preparing the tender shall be borne solely by the Tenderer, including attendance at mid-tender meetings if required.

SUBMISSION OF TENDERS

Tenders shall be submitted in accordance with the instructions outlined in this document or as otherwise required by overriding procurement documents issued by the Client team.

Tenders that omit any part of the specified requirements may be deemed non-compliant.

Any material of a confidential nature submitted by a tenderer as part of their tender should be clearly marked as such.

The Tenderer warrants upon submission of the tender that they have reviewed all tender documents and that the tender submitted is inclusive of all labour, materials and supplies required to deliver the complete operational systems as specified.

DEFINITIONS

The following terms are used throughout this document and are defined as follows:

- SSC Specialist stagelighting & audiovisual systems contractor
- EC General electrical trade-contractor
- CPC Circuit protective conductor (protective earth wiring)
- Containment The term 'containment' in this specification refers to all trunking, conduits, raceways etc., that are used to carry stagelighting and audiovisual power and data cabling. These shall be fully-enclosed steel containment, as described in drawing LVC-CBL-ES-ST-100. Open trays and baskets will not be accepted.

1. GENERAL

1.1. Project overview

Venue Cymru was originally built as the North Wales Theatre, Arena and Conference Centre in 1982. It was expanded in 2006 and renamed Venue Cymru, though a theatre has existed on the site since 1894. The theatre as it is today was officially opened by then-Prince Charles in 1994.

A Charcoalblue feasibility study took place in 2020 focussing on acoustics and auditorium layout, and a further study took place in 2022 relating to stagelighting and audiovisual facilities. Venue Cymru will be undertaking work on the auditorium and an extension to the foyer is planned to take place within the next few years.

This project is focussing on the stagelighting and audiovisual technical infrastructure within the theatre which remains predominantly as it was installed in the 1990s to a design by Carr and Angier Theatre Consultants.

The arena and associated meeting rooms and ancillary spaces are not included, except for the paging system which covers the whole building. See separate section on paging on page 129.

In the past 12 months, the houselighting in the theatre has been updated to LED and a new Paradigm control system has been installed.

This project is looking to replace all the existing LD90 dimmers with switched relays and install an entirely new stagelighting and audiovisual wiring infrastructure, to include new facility panels, as well as an updated backstage paging and video show relay system and a new PA system.

The client wishes for the venue to stay open during this work, and it is Charcoalblue's recommendation that the successful contractor be able to carry out all associated electrical work so that the client is dealing with a single contractor which will be the key to undertaking work of this nature whilst keeping the venue open.

The client has a large stock of temporary cabling and equipment which they will be able to use to enable existing systems to be removed, however the successful contractor must as a priority ensure that they co-ordinate fully with the client as to the phasing of works, to ensure that the installation work and performances can be scheduled around each other. It is imperative that there is no interruption of SLAV services, without prior agreement with the client.



1.2. Procurement

This project is to be a stand-alone contract with the theatre – there is no other main contractor involved.

This document is written as a performance specification for a contractor-design package – the final design of the system will be carried out by the specialist contractor.

1.3. Design Team

The key design team for the project is as follows:

- Client Venue Cymru, Llandudno
- Theatre Consultant Charcoalblue International Ltd

PROJECT INFORMATION

- Site Address: Venue Cymru, The Promenade, Penrhyn Cres, Llandudno LL30 1BB
- Venue Main Contacts: Steve Cridge, Technical and Facilities Manager - steve.cridge@venuecymru.co.uk
Bryn Rosenwould, Technical Manager (Sound) - bryn.rosenwould@venuecymru.co.uk
- Award of Contract: 26/01/2026
- Beginning of Construction: TBC
- Completion Date: TBC

1.4. Programme

27 th November 2025	Notice published on the Sell2Wales and Find a Tender websites. Tender packs available to interested Suppliers via Sell2Wales.
3 rd – 9 th December 2025 (excluding weekend)	Dates available for site visits
13 th December 2025	Deadline for Suppliers to submit queries via Sell2Wales (12pm).
18 th December 2025	The Authority to provide responses to queries via Sell2Wales.
22nd December 2025	Completed tender submission deadline date via Sell2Wales (12 midday).
24 th December 2025	Provisional date for the evaluation process of the written submission(s) to commence.
14 th January 2026	Provisional date to advise Suppliers of their final assessment summaries.
14 th January 2026	Publish a Contract Award Notice and standstill period commences (8 working days).
23 rd January 2026	Provisional standstill period ends.
26 th January 2026	Provisional contract award date.
Within 30 days of the above	Publish a Contract Details Notice.
26 th January 2026	Advance purchase of equipment
26 th January 2026	Contractor design and manufacture period
26 th January 2026	Start on site
TBC	Finish and handover

1.5. Overview of systems

1.5.1. STAGELIGHTING

MAIN THEATRE

SL 1.1 STAGELIGHTING INFRASTRUCTURE

WIRING INFRASTRUCTURE & FACILITY PANELS

The new stagelighting wiring infrastructure will comprise a dedicated containment system and associated wiring, utilising existing containment trunking where possible, supplying stagelighting power to custom socket outlet boxes (facility panels) replacing the existing panels where indicated and removing any facilities panels no longer required. These will be distributed throughout the main theatre - around the stage area, control area, auditorium, balcony fronts and high-level catwalks.

The locations of the facility panels that need replacing are shown in the GA series general arrangement drawings and the panels themselves are detailed in the AS series of drawings. Some facility panels are to be specific sizes to fit within the architectural detailing. Replacement of the current bridge socket raceways as outlined in the supporting documentation are also part of this scope.

A separate containment group - SL/1 - will distribute the stagelighting system wiring:

SL/1 - 230V/400V power wiring (dimmed, switched and unswitched).

Stagelighting data wiring is fed via SLAV/3 containment, terminating at the SLAV facilities panels, as outlined in the Audiovisual section of this specification document.

Each of the individual switched relay outlets in SL/1 will be star-wired back to switched relay racks in the Stagelighting rack room, with SL/2 data circuits star-wired back to the stagelighting control equipment rack (SLR-101) in the same room.

The new containment routes should be based mainly on the existing routes and discussions with the Theatre team. The containment system is to be fully designed and sized by the specialist contractor.

SWITCHED RELAYS

The theatre will be provided with 205 new switched relay channels in nine rack frames - each channel having a maximum current capacity of 10A. These will all be of modular design, housed in high-density racks. Each of the 10A relay channels will be fitted with suitably rated RCDs. Outlets will be distributed in custom facility panels throughout the space as indicated above.

The intention is that the new relay panels will be installed within the existing stagelighting dimmer room on the First floor, to reduce cable lengths and simplify containment routes. The existing LD90 wall mounted dimmer cabinets will be removed by the specialist contractor and disposed of, under direction by the client.

STAGELIGHTING POWER OUTLETS

The distributed facility panels will also contain stagelighting utility 13A power on ring mains. These sockets will be supplied from a new distribution board located in the exiting stagelighting dimmer room.

The Facilities Planning Schedule details the power supplies, dimmer sockets in each facility panel.

WORKLIGHT FIXTURES AND CONTROL SYSTEM

The project includes the installation of blue worklight fixtures in the stage area and some supporting areas. Also included is the removal, refurbishment and refitting as directed by the client of 'SILENCE' signs in the backstage area and Fly Floor Ropes worklights. Existing emergency exit signs are not part of this scope.

The worklight GA layout drawings provide suggested layouts for the new worklight fixtures, along with the associated control circuits and grouping. It may be possible to derive the secondary supply from the theatre's existing battery system, but this will require submittal of the appropriate test measurements and calculations.

Also, within certain SLB panels, dedicated worklight sockets for props table lighting and extra worklights as required will be provided and controlled from the paradigm system.

The existing white worklights for the theatre use two large wall mounted relay banks controlled via an AMX protocol. These are located in the existing dimmer room. All connections to the white worklights must be identified, marked and disconnected from the existing relays. Two new wall mounted switched relay panels will be installed and all existing white worklights re-connected to these new panels, as well as the extra SLB worklight sockets, refurbished 'SILENCE' signs and refurbished fly floor white worklights.

The main theatre currently has an existing paradigm processor, that controls the house lights only. This currently has two, 5-button push stations on stage and one touchscreen in the control room. This processor must be relocated from the current wall mounted rack in the dimmer room, to the new stagelighting data rack (SLR-101) in the same room. New push button and touchscreen stations as indicated in the worklight GA drawings must be installed and instigated within this system. All existing connections to the houselight system must be reconnected to the paradigm processor in its new housing.

The new white worklight switched relay units must also be connected to the re-located paradigm processor.

The new blues system outlined above must also be connected to the paradigm processor.

Under direction of the client, the existing paradigm processor must then be re-programmed for control of all houselighting and worklighting systems within the main theatre, utilising both the existing and newly installed controls around the theatre.

REMOVAL OF EXISTING EQUIPMENT

The specialist contractor will be required to remove the existing dimmers, connection panels, secondary containment and wiring, as well as all existing worklight fixtures, switches and wiring. This is detailed later within this specification.

The theatre team will provide information on existing containment routes, circuits and switching arrangements.

SL 1.2 STAGELIGHTING CONTROL SYSTEMS

STAGELIGHTING CONTROL INFRASTRUCTURE

The project does not include a new control desk – the existing control desk will be retained. This desk must also have the ability to control the current paradigm processor, as required.

A comprehensive stagelighting control network will be installed, with tieline outlets in every audiovisual facility panel, as well as dedicated digital stagelighting DMX control tielines to each of these same facility panels. All tielines will be star-wired from a central patch rack in the existing dimmer room, which will incorporate nodes, switches and splitters to manage the distribution of the stagelighting control signals.

The primary control protocol for the stagelighting in the theatre will be Ethernet-based, complying with IEEE standard 802.3af, distributed over this dedicated stagelighting control network. The control console, dimmers and worklight control system will communicate via this network, with conversion to DMX for distribution to fixtures.

The stagelighting DMX and network tielines are to be radially-wired from the 19" control equipment rack located within the existing dimmer room. All DMX tielines will be wired with CAT6 cable, so that all can be converted to network use in the future.

1.5.2. AUDIOVISUAL

MAIN THEATRE

AV 1.1 AUDIOVISUAL SYSTEMS INFRASTRUCTURE

A dedicated audiovisual infrastructure will be provided within the building including analogue audio, 12G video, multimode fibre, 4 core loudspeaker and Cat6A data, based around an equipment rack room located in the existing dimmer room on Level 1.

The new AV system infrastructure will comprise a dedicated containment system and associated wiring supplying AV services to custom outlet boxes and distributed BS EN 60309-2 sockets. The containment system, technical power panels and load wiring will also form part of the SSC's works and be included for supply and installation as part of this package of works.

Three separate containment groups - AV/1, AV/2 and SLAV/3 - contain the AV system wiring:

AV/1 contains 230v/415v power wiring.

AV/2 contains amplified audio wiring for loudspeakers.

SLAV/3 contains audio, communications, data and video wiring for stagelighting as well as audiovisual systems.

All cabling installed in containment or cavities will be LSZH type.

Bespoke socket outlet boxes are provided to house the audiovisual facilities. The system will be designed to provide audio tielines using digital protocols and analogue interconnections, with home runs back to central patching and distribution within the equipment racks. In addition, there are several 'box to box' links which link key areas of the theatre for visiting companies to use.

The SSC will be responsible for the design and installation of the containment systems on this project. Wherever possible, existing containment and routes should be re-used to minimise the use of additional raw materials. The SSC will also remove all existing Audiovisual and stagelighting data cabling, equipment racks and rack equipment which is being replaced.

The original AV patching was located in the control room and also in a plant room (amplifier racks). The Charcoalblue re-design brings all patching to a central location which is the existing dimmer room – which, when the old dimmers have been removed, there will be enough space for 3 audiovisual equipment racks.

AV1.2 AUDIO SYSTEM

Connection points for loudspeakers are present at key locations within the main auditorium to allow for different formats to be used. A loudspeaker system has been developed with a manufacturer which consists of a left and right mini line array, centre cluster and centrally mounted subwoofers. The bridges have some point source speakers to cover the upper levels of the auditorium.

The audio system will predominantly be in the digital domain, with networked Dante equipment distribution and control, however this will be supported by analogue audio tielines for individual connections at key locations around the stage.

In addition to the main audio system there are loudspeaker connection points around the perimeter of the auditorium which are designed with integral loudspeaker mounting positions which can be used by visiting companies, or it could have loudspeakers installed as a fully immersive audio system.

AV 1.3 COMMUNICATION SYSTEMS

A digital wired and wireless network-based intercom communication system will allow for technical conversations through a reliable wired connection in fixed positions and wireless connections for operators who need flexibility. The system is expandable if so required.

Digital cuelights are provided, run from the stage management desk, this also includes a rope light cuelight system for the fly floor operators.

A mobile Stage Manager's desk will be provided which will have a cuelight control station, intercom station, paging control, a clock, timer, basic houselight controls and script lights to control performances. The desk will be able to be plugged into stage left or right, as well as in the auditorium and control rooms via a set of Cat6A connectors.

1.4 ASSISTED LISTENING

An Auracast Bluetooth-based assisted listening system is provided which has 2 inputs, this is fed via the show relay microphones mounted on the bridges. Users of the assisted listening system can either bring their own device to connect

to the Auracast system or can make use of the 8 devices included as part of this system. An audio describer's desk and headset are provided as loose equipment to be deployed as required.

1.5 VIDEO SHOW RELAY SYSTEM

A dedicated video show relay system is provided which consists of a colour and infra-red camera which will provide a stage picture and a pair of loose cameras to be used for musical directors or off-stage use. All the dedicated video cabling is 12G SDI, however it will be possible to utilise the network infrastructure to send video over this network via NDI.

Video network end points have been allowed for, which enables the venue operators to install screens at any position where a network connection can be made to the Video over IP system (NDI) and the end point decoder will convert from IP into HDMI so that any brand of monitor may be used to display the content. Additional end points and monitors may be purchased by the client later.

The video infrastructure features a small 12G SDI video matrix switcher that can send multiple video signals to up to 20 outlets.

1.6 PAGING & AUDIO SHOW RELAY SYSTEM

The paging and audio show relay system overhauls the existing amplifier and loudspeakers in the backstage dressing rooms, control rooms, stage and galleries. A new network-based controller has been specified to run the paging system which can route audio show relay as well as control background music and paging announcements. A selection of button based, and touch screen paging stations will be provided as well as music input points.

The venue currently has 2 paging systems in use, and this project seeks to replace both control systems with a single new control, this work includes the removal of the 'Digipage' control system whilst retaining the existing amplifiers for the Arena area of the venue. Sections 2 and 3 of this specification and the general arrangement drawings detail the exact work that needs to be undertaken on the paging system.

1.7 About this tender

TENDERING INFORMATION

This document - the Stagelighting and Audiovisual Systems Performance Specification - provides the detailed specification for each element of the works in this system, including information on any further co-ordination issues which are required to be resolved as part of the successful contractor's design process.

This document also includes the scope of works, design preliminaries and standards of execution.

For pricing purposes, this document must be read in conjunction with the Stagelighting and Audiovisual Equipment Schedule (LVC-CBL-SL-EQS-002) which is also available in MS Excel™ format to assist with pricing calculations.

All tenderers must have visited the site prior to tendering. Tenderers shall be deemed to have acquainted themselves with the full nature and extent of the works involved.

HOW TO CROSS-REFERENCE INFORMATION FOR PRICING PURPOSES

Each element of the works is assigned a reference number as defined at the head of section 2.0 of this document.

The Equipment Schedule (LVC-CBL-SL-EQS-002) must be referred to for the bill of quantities for each reference and thereby used to price each element.

The Equipment Schedule must be returned with individual pricing, sub-totals and overall totals correctly completed as part of the tender. Incomplete Equipment Schedules will be treated as non-compliant.

Note: It is the tenderer's responsibility to ensure that all pricing sub-totals and totals are correct; do not rely on Microsoft for this function.

PRICING

Individual equipment pricing may include for supply and installation, or the installation work may be itemised separately at the end of each sheet - this should be made clear on the Equipment Schedule.

Submitted prices must be inclusive of costs for all shipping to the job site as well as all duties and taxes.

Tenders are to include allowances for all meeting attendances and all travel, relocation and/or per diem costs to be incurred during the performance of the work and supporting activities.

The cost of preparing the tender shall be borne solely by the Tenderer.

SUBMISSION OF TENDERS

Tenders shall be submitted in accordance with the instructions as directed by the client.

Tenders that omit any part of the specified requirements may be deemed non-compliant.

Any material of a confidential nature submitted by a tenderer as part of their tender should be clearly marked as such.

The Tenderer warrants upon submission of the tender that they have reviewed all tender documents and that the tender submitted is inclusive of all labour, materials and supplies required to deliver the complete operational systems as specified.

DEFINITIONS

The following terms and abbreviations are used throughout this document and are defined as follows:

- LVC Venue Cymru, Llandudno – the Client
- CBL Charcoalblue LLP – the Theatre Consultant
- UPS Uninterruptible power supply
- CPC Circuit protective conductor (protective earth wiring)
- Containment The term 'containment' in this specification refers to all trunking, conduits,

raceways etc that are used to carry stagelighting power and data cabling. These shall be fully-enclosed steel containment, as described in drawing LCV-CBL-ES-ST-100. Open trays and baskets will not be accepted.

1.8 Summary of works

The works in this Stagelighting and Audiovisual Systems package are listed in Section 3.

The Client reserves the right to omit any element from the contracted works following evaluation of tenders.

It will be expected that the tenderer has allowed for significant co-ordination time in their return, concurrent with their extensive experience of similar re-fit projects and their knowledge of the inherent complexity of theatrical buildings, as follows:-

- The contractor shall co-ordinate all temperature control requirements in the dimmer/rack room with the LVC team.
- The contractor shall co-ordinate all items of architectural integration with CBL and the LVC team, including builderswork holes and opening up of existing finishes to access containment routes.
- The SSC shall liaise closely with CBL and the LVC team with regard to final choices of equipment, the programming of control panels, rack layouts and general ergonomics of the system.
- The SSC shall be responsible for co-ordinating all requirements for power and containment.
- The SSC shall perform final calibration and testing of the systems to meet the set criteria.
- The SSC shall return to site at an agreed period, typically within 6 months after Practical Completion, to make any final adjustments to the worklight control system programming and the paging control system as identified by the Client.

Note: Since it is intended that this package is to be let as a Contractor Design portion of work, all preliminary engineering and design information contained in this or any other relevant tender document is for use in developing general design concepts only.

All Charcoalblue information is issued as 'Design Intent' information only and has not been reviewed or inspected for engineering accuracy or completeness. The design responsibility for a fully-functioning, installed system that meets the performance requirements in this specification in full remains with the SSC.

1.9 Summary of contract documentation

This specification is to be read in conjunction with the following schedules:

- **Equipment schedule:** This lists the items required for this system and shows the sub-systems in which the items will be used. Included in this schedule are the socket outlet boxes whose contents are listed in the facilities planning schedule described below. The manufacturers and model numbers listed in this equipment schedule are intended to establish a standard of performance and quality. Alternative products may be proposed - see section 1.9 below.
- **Facilities Planning Schedule:** This details the contents of the socket outlet boxes which are to be supplied as part of the contract, showing the connectors, as well as the cabling associated with each type of facility.

This specification is to be read in conjunction with the following drawings:

General Arrangement drawings: These show the general architectural arrangement of the building, with the locations of all items of equipment to be installed under the contract.

Assembly drawings: These provide details of the arrangement of equipment in the equipment racks, of custom-manufactured outlet boxes and control stations etc, as well as detailed installation drawings.

Schematic drawings: These provide an overview of the wiring and interconnections of the systems.

Please refer to the Drawing Issue Register in the Appendix for a full listing of the drawings associated with this specification.

The SSC shall immediately report to CBL any errors, omissions or conflicts discovered in these documents, drawings or specifications, in order to receive clarification. The contractor shall attempt to interpret any such errors or conflicts in such a way as to accomplish the design intent of these plans and specifications to the satisfaction of the LVC team and CBL.

All drawings and documents provided as part of this specification must be regarded as confidential and only disclosed to a third party to the extent necessary to complete your tender. The Client requires that all working papers and electronic data must be immediately destroyed by tenderers if they are notified they have been unsuccessful.

1.10 Supplementary information

This document is to be read in conjunction with any general project information supplied by LVC.

In particular, reference should be made to LVC for details on -

- Program - delivery, installation and completion dates. The SSC shall identify in their tender any long lead time equipment items or any other matter that may adversely affect the project program. In particular, LVC require the work to take place whilst the venue remains open. Close co-ordination with LVC is required to minimise disruption to the ongoing performances. If the SSC requires to work out of hours to maintain momentum during the construction period, this should be discussed and agreed directly with LVC.
- Drawing issue procedures and issuing of paper versus electronic information, as-built information and O&M manuals.
- Project procedures, meeting schedules, conflict resolution, etc.
- Deliveries, storage, disposal of packaging, etc.
- Use of cranes, lifting equipment, access equipment, etc.
- Risk assessments required for work on site.

1.11 Summary of qualifications

All tenderers shall provide, if requested to do so, proof of their financial ability to complete the contract works.

All tenderers shall have installed systems of a similar type, scale and value to those described in this specification for a period of at least five years and shall provide details within their tender return of at least three relevant reference projects completed satisfactorily in the previous five years.

As this subcontract includes the design responsibility for a fully functioning system, it is expected that the tenderer will carry Professional Indemnity Insurance cover to a minimum of £1m for each and every claim.

All tenderers shall provide, if requested to do so, evidence of their professional indemnity and public, product and employers liability insurances for the completion of the contract works.

The Client and Theatre Consultant reserve the right to inspect any previous equipment or systems supplied or installed by the tenderers.

All tenderers shall have sufficient resources to enable them to provide the necessary professional design, fabrication, installation and project management personnel to ensure complete, functional systems in accordance with the intent of these specifications.

All tenderers shall be IEE and NICEIC registered as suitably qualified to undertake electrical installations of this nature. Registration certification shall be made available on request.

1.12 Equivalent products

Where specific makes and/or models of equipment are identified in this document, Tenderers must provide in their base tender a cost for supply of this equipment. Tenderers are welcome to make a separate offer for the supply of alternative but equivalent equipment. Any such alternative offer is to be issued as a separate document or schedule to avoid confusion and aid comparison between tenderers.

In this case, tenderers shall provide full documentary evidence that any alternative product proposed is equivalent in respect of safety, reliability, performance, material, functionality, appearance and compatibility with associated systems.

All deviations from the specifications must be outlined in a separate document and included with proposals. Failure to fully describe all deviations could be grounds for rejection of the alternative equipment. Any non-English language documents must have a certified English translation.

Any proposal for the use of an alternative product must include proposals for the substitution of compatible accessory products as necessary with documentary evidence as above.

The Client will normally take all alternate offers under consideration, but please note that there may be occasions when the specification states that only approved makes and models will be accepted. This will usually be due to a specific Client request or for reasons of compatibility with existing equipment.

1.13 Summary of submittals

The following items shall be submitted as part of the tender return:

- Equipment Schedule - complete with details of manufacturer and model number for all non-custom equipment and showing unit prices and totals. Tenderers must complete the schedule supplied in full. An Excel version will be made available on request.
- Supporting technical documentation (data sheets, brochures etc.) for all standard (non-custom) items of equipment identified by the tenderer as part of the equipment schedule.
- Schedule of any items which the tenderer believes to have been omitted from the schedule of equipment, but which they consider to be necessary to provide a fully functional system.
- Supporting company documentation, e.g. Health & Safety policy, program, etc.
- Draft program of works showing time periods required for design, manufacture, installation & commissioning
- The name of the project manager for the duration of the project, including details of their qualifications and experience in similar projects. This person shall have full managerial and financial responsibility for the project and shall be actively involved in the project. Once a contract is awarded the site team shall be named.
- Details of which elements of the project, if any, are to be sub-contracted to other companies or individuals not directly employed by the tenderer. Details shall be given as to how quality will be maintained on sub-contracted work, and the structure of the relationship.

After award of contract, the successful contractor shall provide the following documentation for review in accordance with the program and before commencing manufacture:

- A program showing the delivery dates for all design stage deliverables.
- Final schedule of equipment.
- Scale location drawings for equipment in plan and elevation views.
- Details of all custom finishes.
- Technical submittals for all contractor-nominated equipment not previously submitted
- Shop drawings of all custom-manufactured items.
- Shop drawings of all equipment racks and rack-mounted equipment, including patch panel layouts and proposed labelling.
- Details of operational clearance, if any, required around equipment, including any associated builderswork, including access requirements for installation and maintenance.
- Rack room layout.
- Schematic drawings showing signal flow for all systems within this package.
- Cable schedule & rack wiring schedules

Review of submitted documentation by the Theatre Consultant does not relieve the contractor of the responsibility for design or of providing equipment fully in accordance with the specifications. The Theatre Consultant will not be responsible for the completeness or accuracy of the contractor's drawings following the review.

Following approval of shop drawings and prior to the commencement of manufacturing, the contractor shall supply the following samples. If appropriate, these samples may be used for installation after approval:

- A typical stagelighting system outlet box (backbox & faceplate).
- A sample of each type of connector not included in the sample box.
- A sample of each type of cable.
- A sample of any other custom finishes required for equipment to be installed in areas visible to the public.

The contractor shall provide the following information for review by the Theatre Consultant and Client. at least four weeks prior to final inspection, test and commissioning:

- System firmware, configuration and documentation for non-proprietary software, including a demonstration of any test configuration running on off-line software.
- Method statements and sample test sheets for final inspection.
- O&M manuals as described later in section 1.19.
- Proposed training schedule for Client team

1.14 General design criteria

The design of the stagelighting and audiovisual systems shall be in accordance with the legislation, specification standards and codes of practice listed in this document. Where standards and codes are contradictory or unavailable then conservative margins arrived at through recorded risk analysis shall be used.

System designs shall only include proven technology that can be demonstrated to have worked reliably for a substantial period, under similar conditions and for similar purposes in other completed installations.

Design proposals shall be thoroughly analysed and verified by the contractor prior to manufacture and installation. Where the contractor has any doubt as to the validity of the design or is uncertain that the required performance will be achieved, then they shall create mock-ups or carry out other forms of simulation, tests and calculation as necessary to ensure that the detailed design by the contractor shall provide a system which functions as specified.

High quality components and materials with documented, known and predictable performance shall be used throughout. Particular care shall be taken in the selection of items known to be a frequent cause of reliability problems such as fasteners and electrical connectors.

All equipment proposed and supplied shall be new and shall meet or exceed the technical and performance requirements outlined in the tender documents.

Where supplied items are manufactured by the contractor, manufacture, assembly and installation shall take place in a quality-controlled environment with comprehensive records kept of material provenance, testing and other quality assurance procedures.

Custom items engineered and fabricated by, or on behalf of, the contractor, whether software or hardware, shall not be subject to royalty, patent, copyright or any other payments or conditions.

Equipment shall be able to function reliably with normal maintenance for at least 10 years.

Systems shall be designed to be tolerant of normal and predictable abuse as informed by the contractor's previous relevant and extensive experience. Vulnerable items shall be protected from predictable causes of damage.

Systems shall have fault-tolerant features wherever practical such that the failure of any one component shall not prevent use of the entire system.

The electrical/electronic systems shall be tolerant of brief fluctuations in power supply and shall not be vulnerable to damage in the event of power failure.

1.15 Acoustic criteria

Protecting the acoustic quality of the space is vital to the success of the project. Systems are to be designed so that any equipment that generates noise shall not cause the background noise criterion to be exceeded for the space in which it is located.

Equipment to be installed in areas that can form part of the acoustic volume of the spaces must be effectively silent in operation. Where this equipment includes fans, these are to be high-quality, low speed fans.

1.16 Bespoke systems

Where the contractor proposes to supply a bespoke solution or unusual technology from a specialist source to meet this specification, the contractor shall seek written approval from the manufacturer of the equipment for the installation of the equipment in terms of the nature of the overall system, the specification of all system components, methods of installation, intended use and ability to meet the specified performance.

In addition, the contractor shall seek written confirmation from the manufacturer of the equipment of the skills, qualifications and experience of the persons tasked with the installation as being adequate for the installation, testing and commissioning of the equipment.

1.17 Regulations

LEGISLATION, STANDARDS AND CODES

The specialist sub-contractor shall be required to comply with all current and applicable legislation, specification standards and codes of practice which may include, but are not limited to:

- The Health and Safety at Work etc. Act, 1974 and as amended.

- Fire Precautions Act, 1971 and as amended.

- Electricity at Work Regulations, 1989 and as amended.

- Construction (Design and Management) Regulations, 2015 and as amended.

- Manual Handling Operations Regulations, 1992 and as amended.

- Provision and Use of Work Equipment Regulations (PUWER), 1998 and as amended.

- Lifting Operations and Lifting Equipment Regulations (LOLER), 1998 and as amended.

- Management of Health and Safety at Work Regulations, 1999 and as amended.

- All appropriate IEC, EN and British Standards including the following (and as amended or superseded:)

 - BS 7671:2018 (18th Edition) Wiring Regulations incorporating all Amendments

 - BS 5950:1985-2012: All parts. Structural use of steelwork in building. Specifications and codes of practice.

 - Local Authority Building and Licensing Regulations

 - ABTT Technical Standards for Places of Entertainment ("The Yellow Book") 2020.

Electrical equipment shall conform to the requirements of the Low Voltage Directive 73/23/EC and as amended.

The electrical installation shall conform to the requirements of EMC Directive 89/336/EEC plus amendments. Where relevant the installation shall comply with the revised EMC Directive 2004/108/EC.

The electrical installation shall be installed in accordance with the recommendations of IEC 61000-5-2:1997 (Electromagnetic Compatibility (EMC) - Part 5: Installation and Mitigation Guidelines - Section 2: Earthing and cabling)

All equipment and wiring must be suitable for use in the UK and shall conform to all British Standards and directives in effect at the time of installation.

In the event of a conflict between the requirements and/or specifications of any of the above codes and/or standards and these specifications, the most stringent requirements or specifications shall apply. If this affects the operation of performance systems, the contractor shall inform the Client, and shall not proceed until the conflict has been fully resolved

The completed installation shall not present any threat or safety hazard to users, performers or audience. All installed cabling is to be LSZH.

1.18 Inspection and test procedures

1.18.1 OFF-SITE MANUFACTURE & ASSEMBLY

The SSC shall assemble the required samples as detailed above and make these available for inspection at their premises. The SSC must provide three weeks' notice, in writing, of the availability of the equipment for inspection.

The samples inspection must take place before the fabrication and procurement of the remaining equipment is undertaken so that the equipment can be reviewed and if necessary, changes made prior to commencing full manufacture.

The SSC shall perform detailed testing of all systems at their premises, prior to delivery to site and shall provide a summary of these tests in the Operation and Maintenance Manual described below.

The Theatre Consultant, Client and/or their nominated representative reserve the right of inspection at reasonable notice and shall be allowed access to inspect manufactured items at the SSC's premises.

The SSC shall provide the Client with a Workshop Test & Inspection Report detailing all workshop quality assurance and test results.

Equipment shall not be delivered to site without first receiving written acceptance of satisfactory workshop inspection.

1.18.2 ON-SITE PRELIMINARY INSPECTIONS

Preliminary site inspections will be made by the Theatre Consultant and Client and/or their nominated representative during the course of the installation.

The Client and/or their nominated representative reserve the right of inspection at reasonable notice and shall be allowed access to the site to verify materials for eventual incorporation in the work.

Inspection and testing of components during preliminary inspections shall not preclude the possible rejection of components during the Final Inspection detailed below.

The SSC shall give advance notice of inspections or tests arising from local bylaws, ordinances or the requirements any public authority. This might for example include the need to demonstrate portions of the installation as a part of safety inspections required by the Building Control or Fire Officers.

1.18.3 FINAL INSPECTION, ACCEPTANCE AND HAND-OVER

The SSC shall have completed all the installation work, full system tests and fault clearance, all certification required by legislation and all required adjustments for fit, finish and functionality prior to the date at which the Final Inspection commences.

The Final Inspection will be undertaken by the Client and the Theatre Consultant following written notification from the SSC that the installation is completed. The SSC shall give a minimum of two weeks' notice.

The Final Inspection falls into two categories:

1. Infrastructural testing: to check that all cabling is certified as safe and compliant, functional and complete.
2. Functional inspection: to check that all systems and equipment are in working order, functioning and interacting correctly and ready for handover to the Client.

At the discretion of the Theatre Consultant and Client, functional commissioning of the systems shall not happen until the infrastructure testing has been completed with all defects rectified.

The whole of the work shall be carried out to the reasonable satisfaction of the Theatre Consultant who shall have the right at any time to reject any component, material or workmanship which is, in their opinion, defective or not to specification. The SSC shall, immediately they are instructed, replace such defective material or component or rectify such bad workmanship without charge.

For the purposes of the Final Inspection, the SSC shall fully test and demonstrate all systems in the presence of the Client and Theatre Consultant including providing suitably qualified staff to adjust equipment as considered necessary. The SSC shall supply any additional equipment required to fully test and demonstrate all systems.

1.18.4 INFRASTRUCTURAL TESTS

The following submissions from the SSC are required prior to the Theatre Consultant and Client commencing the infrastructural tests:

- SSC cable testing method statement (four weeks prior to final inspection)
- Full test report denoting individual cable testing and result
- Full report of faults and rectification works
- Sign off from SSC Project Directors that all cabling works are completed and ready for the Theatre Consultant's verification and commissioning.

Infrastructure testing refers to the demonstration of compliance by the SSC of the following items:

- System cabling, including all equipment rack outputs
- Facility panel installation and termination.
- All signal, data and power connections between facility panels are correctly sequenced and labelled.

1.18.5 FUNCTIONAL INSPECTION

Once infrastructural testing is complete, the SSC shall demonstrate to the Theatre Consultant and Client:

- The full schedule of supplied equipment, manuals, warranty and other certifications are present and in order.
- All equipment and systems are safe, in working order and free from damage.
- The robustness and neatness of all supplied facility panels, equipment racks and cable terminations (internal and external inspections).
- All control consoles and systems are correctly configured and interaction between control equipment and systems is functioning correctly, including any required interactions with systems provided by others.

1.18.6 DEFECTS AND RE-INSPECTION

If inspection reveals any detail of fabrication, installation or equipment not in strict accord with the specification and contract requirements, final approval will be withheld and the SSC shall be provided with a 'snagging list' containing details of remedial work required. The SSC shall, without delay, make such changes as are necessary to ensure that the fabrication, installation and equipment comply with the requirements of the 'snagging list.'

Upon completion of this work the SSC shall give written notice that the equipment is ready for re-inspection.

Re-inspection shall take the same form as the Final Inspection, with the SSC carrying out any relevant tests or demonstrations.

All subsequent re-inspections shall be at the cost of the SSC who will be responsible for expenses necessarily incurred by others.

Delays or abortive inspection visits arising due to incomplete work, improper or unsafe installation or inoperative equipment will result in the Theatre Consultant's time being billed to the SSC at consulting rates prevailing at the time, plus expenses at cost.

The SSC shall ensure that adequate time is allowed in their program for any remedial work and further testing.

The SSC shall be aware that failure to complete the work by the date of Practical Completion will expose them to having to provide labour and supervision on site at times decreed solely by the Client until the Contract is completed satisfactorily. Much of the completion work may have to be carried out at night.

1.19 Test reports and quality assurance certification

The SSC shall provide the following

SPECIALIST CONTRACTOR MANUFACTURED/ASSEMBLED ITEMS

Following workshop quality assurance inspection and relevant testing the SSC shall submit a Workshop Test Report detailing inspection results and test certification.

PROPRIETARY ITEMS FROM THIRD-PARTY SUPPLIERS

All items manufactured, assembled and supplied from third-parties must be accompanied by appropriate quality assurance documentation certifying that the product is new, inspected and safe to use as required by relevant legislation.

FINAL TEST REPORT, TEST RECORDS AND CERTIFICATION

Prior to acceptance and hand-over, the SSC shall submit a Final Test Report which by the use of completed test sheets, measurement data, graphs and other notes indicates the fully functional status of all components of the installed systems. This report shall be accompanied by a letter from the SSC, certifying that the equipment is safe, functional in every respect, meets the design requirements of the specification and is ready to be handed-over.

This report must include test records, records of visual examination and other relevant certification.

All test report information must be clearly identified to the appropriate system component by means of serial numbers.

1.20 Operation and maintenance manual

The SSC shall supply the following documentation in the form of an operation & maintenance manual for the Stagelighting and Audiovisual system.

Two printed copies and one electronic (in Adobe Acrobat pdf format) copy shall be supplied to the Client, and one electronic copy to the Theatre Consultant.

A draft copy must be presented to the Theatre Consultant and the Client for review at least four weeks before the date of the final inspection.

The operation manuals shall include, as a minimum, the following:

- System descriptions, covering assembly and configuration.
- Screen shots and descriptive text for each page of touch screen system control.
- Description of operating procedures for installed systems.
- Manufacturers' operating manuals, service manuals and related documentation for all supplied proprietary equipment.
- Periodic maintenance procedures.
- Safety procedures, including thorough examination and testing procedures that are required for each type of re-installation and re-configuration.
- List of spare parts and equipment
- 'As-built' versions of all drawings and schedules, including equipment wiring and termination schedules, circuit diagrams and system schematics.
- Workshop Test & Inspection Reports detailing all workshop quality assurance and test results
- All software, configuration and programming files in soft-copy
- Final copies of test and inspection reports.
- Copy of warranty agreement described below.
- SSC contact details and emergency/out-of-office hours contact arrangements.
- Full asset register noting equipment type, make and model, and appropriate unique identifying label.

1.21 Training

1.21.1 CLIENT TRAINING

The SSC shall train the Client's operating and maintenance personnel in the operation and care of the equipment.

The training shall include:

- Operating procedures for proper use of all systems, including procedure for making any adjustments to the systems.
- Nature of interfaces and operation of equipment supplied under this specification where operation depends on systems supplied by others.
- Inspection and testing procedures as relevant.
- Maintenance procedures.
- Replacement procedures for user serviceable parts.

Factory training by sub-system or component suppliers shall be included as appropriate.

All other training shall be performed on-site by a suitably qualified instructor. The training shall take place after the systems are operational, but before the final inspection, unless otherwise agreed by the Client.

The SSC shall establish the specific structure and scheduling of training provided in co-operation with the Client, prior to completion of installation and at least at least four weeks in advance of the first training session. Appropriate training materials (operating summaries, handouts, etc) shall be provided at the training session(s).

It is anticipated that this training will take the form of 3no. 4-hour sessions (as a minimum) for up to four of the client's staff which may take place on separate days.

1.21.2 CLIENT FIRST-USE SUPPORT

The SSC shall provide the Client with the services of a qualified engineer to advise and assist on site as necessary for the first use of the installation, on a date to be notified by the Client. This may be a long day up to 13 hours.

For this project, this service can be coordinated with the specified training program.

1.22 Warranty

1.22.1 GENERAL CONDITIONS

The SSC shall provide a written warranty for all systems included in the contract works. This warranty shall be valid for a minimum period of 12 months from the date of acceptance of handover by the Client.

The SSC shall provide full contact details as part of the Operation and Maintenance Manual detailed above. This shall include arrangements for emergency and out-of-office hours call-out.

All guarantee and warranty work shall be carried out at no additional cost for any labour, materials or transport.

Warranty replacement proprietary equipment shall be provided within two days of official notice by the Client. Repairs and replacements to items manufactured by the SSC or part of a bespoke installation shall take place at the Client's request at the earliest opportunity at which safe access to the installation can be arranged.

The Client requires attendance at site within two days of a call-out for warranty issues.

All guarantee and warranty work shall be carried out at no additional cost for any labour, materials or, transport.

Warranty of repairs to the installation, replacement equipment and components shall be the same as for the original installation and equipment and shall begin on the date of installation of the replacement item.

1.22.2 FOLLOW-UP TESTING AND ADJUSTMENT

The SSC shall provide suitably qualified personnel to test and adjust the equipment as relevant at a mutually acceptable time, approximately three to six months after final acceptance of the equipment and again at 12 months after the final acceptance of the equipment.

These follow-up visits shall include required testing and adjustment as required by maintenance procedures as well as repair of all items covered under the warranty.

The SSC shall make allowance at this visit for updating the default presets and operating syntax of any custom configuration software in line with the Client's wishes - e.g. the houselight control system or the paging system.

The SSC shall provide a written report to the Client detailing the extent and results of the follow-up testing, adjustment and repairs.

1.22.3 REPEATED FAILURES - UNSATISFACTORY EQUIPMENT

If a particular component, part, or module of the installation fails more than three times during the warranty period, the failure shall be deemed to be due to engineering design and/or installation error.

In this event, the SSC shall, within two days' notice from the Client, take action to modify or correct the defect by changes to engineering design or, installation methods.

1.22.4 ON-GOING SUPPORT

The SSC shall provide telephone support, during office hours, at no additional cost to the client.

The SSC shall provide a minimum of one year's service for operational and statutory compliance, support and replacement parts at reasonable cost, for the installation irrespective of any other warranty, on-going support and maintenance agreements.

Note: Tenderers are to provide a cost for an optional annual service contract, as part of the tender documents.

2 EQUIPMENT

This section provides the specification for the equipment required for the contract works.

The Equipment Schedule (LVC-CBL-SLAV-EQS-001-Equipment Schedule) provides details of quantities and ‘approved’ makes & models. All tenderers must make a main tender return without deviation from the ‘approved’ equipment as listed. An alternative and separate submission may be made, if desired, using equivalent products at the tenderer’s discretion. Supporting technical documentation for all equivalents offered must be included in the separate submission.

The descriptions are divided into broad categories as follows:

- 2.1 General
- 2.5 Stagelighting equipment
- 2.6 Audiovisual equipment

Note that only equipment relevant to this contract is described and thus some of these categories may not be used in this document.

Each item of equipment is identified by a code in the format 0.00-XXX-YY/ZZZ which may be interpreted as follows:

- 0.00 - The initial number indicates the broad category to which the item belongs.
- XXX - These three numbers / letters are a code for the type of equipment within the category.
- YY - The next two numbers / letters are a code which further defines the equipment requirements on which the specification is based.
- ZZZ - The final three numbers / letters allow any number of different variants of the item to be defined

So for example an equipment rack might be given the code 2.13-IER-01/842, where:

- 2.13 is a general category for equipment racks.
- IER is a code describing an installed equipment rack.
- 01 represents a particular make and model of equipment rack used as the basis of the specification.
- 842 presents the depth (800mm) and height (42U) of the specific equipment rack required.

2.1 General equipment

2.13 Equipment racks and accessories

2.13-BLK-01	RACK BLANK PANELS
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Description:
High-quality blanking panel to fit standard 19" rack width.

Construction:
Steel with curved edges

Finish:
High-quality powder-coat black finish

Mounting:
Mounted in equipment rack as detailed in equipment schedule and assembly drawings.

Variants:
The following variants are required:
2.13-BLK-01/001 19" Rack Panel Blank

2.13-CMB-01	CABLE MANAGEMENT BAR
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Description:
High-quality 1U rack-mounted cable management bar
With 5 or more cable management hooks

Construction:
Steel

Finish:
High-quality powder-coat black finish.

Mounting:
Mounted in equipment rack as detailed in equipment schedule and assembly drawings.

Accessories:
Supplied with all necessary mounting and power cabling.

Variants:
The following variants are required:
2.13-CMB-01/01U 19" rack mount 1U cable management bar
Approved: Penn Elcom R1285-CMP-1UK

Description:

High-quality wall mountable patchcord holder suitable for holding multiple audio, data and video patchcords vertically

With space for at least 40 cables

Construction:

Steel

Finish:

High-quality powder-coat black finish.

Mounting:

Mounted to the sides of equipment racks where space allows once the racks have been installed

Accessories:

Supplied with all necessary mountings to fix to the equipment racks

Variants:

The following variants are required:

2.13-CPH-01/001	Patchcord holder for storage of AV patchcords affixed to side of AV racks
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Approved:	<i>Penn Elcom R1316</i>
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Description:

1U panel mount power distribution unit with 5 front mounted power switches to enable rack equipment to be turned off when not in use.

Construction:

As supplied.

Finish:

High-quality powder-coat black finish.

Mounting:

In equipment racks as shown on the Assembly Drawings.

Accessories:

Supplied with all necessary mountings to fix to the equipment racks and cabling to connect power into the unit and to feed rack mounted equipment.

Variants:

The following variants are required:

2.13-CSU-01/005	1U 16A input 5 channel unit with individual switches for turning items of rack equipment off when not in use.
Approved:	<i>Penn Elcom PDU16-5DJ-AV</i>

2.13-DRW-01 RACK DRAWER

Description:

High-quality rack-mounted drawer unit to fit standard 19" rack width. Latching lockable handle to be flush mounted onto front of drawer

Construction:

Steel

Finish:

High-quality powder-coat black finish

Mounting:

Mounted in equipment rack as detailed in equipment schedule and assembly drawings.

Variants:

The following variants are required:

2.13-DRW-01/002	Rack-mounted lockable drawer, 2U
Approved:	<i>Penn Elcom</i>
2.13-DRW-01/003	Rack-mounted lockable drawer, 3U
Approved:	<i>Penn Elcom</i>

2.13-IER-SR INSTALLED EQUIPMENT RACK

Description:

High-quality wall-mounted or floor-mounted installed equipment rack.

Rear of rack to be fitted with suitable cable management systems to allow all installed cabling to be neatly routed and terminated, and with suitable internal mains distribution sockets for the full height of the rack. Correct sub fusing and mains distribution to be supplied and installed.

Standard width rack to be 800mm in width.

Construction:

Steel. Racks to be of a maximum height as indicated in the assembly drawings.

Finish:

High-quality powder-coat black finish - a single manufacturer or contractor logo may be displayed per rack.

Mounting:

Wall-mounted or floor-mounted as noted on attached schedules and drawings.

Accessories:

Fitted with internal locally-switched inspection light in rear of rack.

Supplied with any necessary blank panels, vents, cable hooks and brush strips - refer to rack layout drawings.

Rack identifications strips to be traffolyte engraved not laminated or printed labels.

Supplied with all necessary mounting bolts and cage nuts for mounting of equipment and/or blank panels. Any timber cable management plinths as required.

Provided with acoustic isolation seals at entry points of containment.

Variants:

The following variants are required:

2.13-IER-SR/842	Floor mounted 42U high steel rack, black finish, 800mm deep with custom internal power distribution, blanking and ventilation with all fixings.
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2.13-IDR-36	REMOVE EXISTING AV RACKS
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Description:

Removal of existing AV racks, rack equipment and cabling which is no longer being used.
The SSC must ensure that any equipment/ cabling / patchbays are not required before removal.
All equipment being removed must be offered to the client, and if the client does not want it, it should be recycled.

Variants:

The following variants are required:

2.13-IDR-36/EXI	Remove existing AV racks and associated cabling and containment and dispose/recycle as instructed by client
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2.13-SHF-RM	19" PULLOUT RACK SHELF
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Description:

High-quality rack-mounted shelving unit to place laptops or control devices on.
To extend by no less than 400mm.

Construction:

Steel fitted with anti-slip mats and a handle for pulling out

Finish:

High-quality powder-coat black finish

Mounting:

Mounted in equipment rack or lectern as detailed in equipment schedule and/or assembly drawings

Variants:

The following variants are required:

2.13-SHF-RM/001	Installed 1U 19" rack shelf - pullout, black
2.13-SHF-RM/002	Installed 2U 19" rack shelf - pullout, black

2.13-UPS-RK UNINTERRUPTIBLE POWER SUPPLY – RACK MOUNTED

Description:

High performance battery back-up unit to provide uninterrupted power to data distribution devices in the event of a momentary power outage, and to provide battery-backed power in the event of a total loss of building power, so that control systems can be closed down safely with no corruption or loss of data.

Rack-mounted type to be located at the base of each equipment rack and to incorporate internal power distribution with suitably rated breakers on the outlets to distribute UPS power to all control equipment within rack.

Indication of 'healthy' and 'battery in use' to be clearly visible on front panel with an audible alert in the event of a loss of power.

Construction:

Steel, rack-mounted enclosure.

Finish:

Manufacturer's standard finish.

Mounting:

In base of each equipment rack.

Accessories:

Supplied with all necessary mounting and power input and output cabling.

Variants:

The following variants are required:

2.13-UPS-RK/010	Rack-mounted UPS for stagelighting/audiovisual data system to power all local rack equipment for 10 mins upon power loss.
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Approved: *APC Smart UPS*

2.13-VNT-01 RACK VENT PANELS

Description:

High-quality venting panel to fit standard 19" rack width.

Construction:

Steel with curved edges

Finish:

High-quality powder-coat black finish

Mounting:

Mounted in equipment rack as detailed in equipment schedule and assembly drawings.

Variants:

The following variants are required:

2.13-VNT-01/001	19" rack vent panel
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2.15 Installed wiring & containment

2.15-CTS-90CONTAINMENT SYSTEM FOR STAGELIGHTING SYSTEMS

Description:

A fully-enclosed steel containment system is required for power wiring to provide adequate electromagnetic shielding and protection for the adjacent AV wiring.

Wherever possible – Existing containment and containment routes should be utilised to save on installation costs and additional raw materials.

Any existing containment not required should be removed and recycled as instructed by the client.

This containment forms part of the SSC's scope.

Construction:

Fully-enclosed steel containment. Open cable basket or tray will not be acceptable. Complete with all fixings, grommets, bushes, glands and accessories. Containment should be isolated from acoustic transmission from vibrations at relay racks.

Segregation:

The Stagelighting wiring is to be divided into the following containment group:

- SL/1 - Installed low-voltage power wiring for stagelighting system (as designed by the electrical systems designer following advice from the Theatre Consultant)

Refer to drawing LVC-CBL-ES-DT-001 – Containment Separation for details of physical separation required between containment groups.

Variants:

The following variants are required:

2.15-CTS-90/012	One part containment system for SL/1 – Main Theatre
2.15-CTS-90/EXI	Utilise existing containment where possible as required for SL/1. Remove any existing containment not required and dispose/recycle as instructed by client – Main Theatre

Description:

A Three-part, fully-enclosed, steel containment system is required to provide adequate electromagnetic shielding and protection for the audiovisual cabling.

Wherever possible – Existing containment and containment routes should be utilised to save on installation costs and additional raw materials.

Any existing containment not required should be removed and recycled as instructed by the client.

This containment forms part of the SSC's scope.

Construction:

Fully-enclosed steel containment. Open cable basket or tray will not be acceptable.

Segregation:

The Audiovisual wiring shall be divided into the following containment groups:

- AV/1 - Installed audiovisual system power wiring (as designed by the electrical systems designer following advice from the Theatre Consultant)
- AV/2 - Installed loudspeaker wiring
- SLAV/3 - Audiovisual communications cabling; this is the broadest category and includes video cable, digital audio cable, and communications cable as well as Starquad type analogue/AES digital Audio.

Refer to drawing LVC-CBL-ES-DT-001 for details of physical separation required between containment groups.

It may be possible to run AV/2, 3 & 4 in three-part containment, but AV/1 should be kept separate from these three other groups.

Variants:

The following variants are required:

2.15-CTS-95/013	Three-part containment system for AV/1, AV/2 and SLAV/3
2.15-CTS-95/EXI	Utilise existing containment where possible for new containment groups, maintaining separation, as required for AV1, AV/2 and SLAV/3. Remove any existing containment not required and dispose/recycle as instructed by client.

Description:

Screened Quad / MultiQuad Audio Installation Cable twisted pair cables with additional overall braided screen.

Construction:

Cores to be min. 7/0.2mm (0.22mmsq) OFC type with tinned copper braid screen and tinned stranded drain wire.

Resistance to be < 0.085 Ohms/m.

Suitable for transmission of analogue and AES3 digital audio.

Cables to adhere to no smoke, zero halogen when installed. Jackets constructed from LFH compound; no PVC.

Where multiple A01 types appear, it may be possible to use multicore audio cable, subject to approval from the Theatre Consultant.

Mounting:

Installed in containment system and/or as equipment interconnect as noted on schematics.

Variants:

The following variants are required:

2.15-WIR-01/A01	Screened twisted dual pair with overall screen - Starquad Type
Approved:	¹ <i>Belcom Eventseries 220-4601-01</i>

Description:

Category 5, 6, 6A or 7 installation insulated twisted copper pair data cable. As described in ANSI/TIA-568 and global cabling standard ISO/IEC 11801 – with reference to maximum permitted cross talk and attenuation.

Note that in general the network installation has been designed with the intention that no installed data cable is greater than 90m in length. Or when this is anticipated additional range extenders have been allowed for. However, where cable runs are measured on site and found to exceed 90m in length, additional network extension equipment must be installed to reduce individual cable lengths to below 90m. Where this is found to be necessary, proposals for the installation of additional equipment are to be submitted for approval prior to installation.

CAT 5e and CAT 6 cabling is to enable 1Gb/s ethernet speeds up to 90m. CAT 6A is to enable up to 10Gb/s up to 90m distance. CAT 6 cable to enable speeds of 10Gb/s at lengths under 45m.

Ethernet cabling is to support POE++.

Construction:

Cables to adhere to no smoke, zero halogen when installed. Jackets constructed from LFH compound; no PVC. Cable should not be bent or twisted. Outer jacket should not be stripped back in excess of requirements for connector – no exposed copper should be visible.

Mounting:

Installed in containment system and/or as equipment interconnect as noted on schematics.

Variants:

The following variants are required:

2.15-WIR-02/D6U	CAT 6A UTP data cabling
2.15-WIR-02/D6F	CAT 6A S/FTP Overall braid screened cable with foil screened balanced elements data cable.

2.15-WIR-03 INSTALLED WIRING - CO-AXIAL CABLE

Description:

Coaxial cable suitable for analogue and 12G-SDI video.

Cable lengths must be confirmed and suitable cabling must be selected that can carry the full 12G bandwidth for the whole length of the cable routes.

Construction:

Central core with co-axial braided screen in overall sheath.

All cable used for video should be suitable of analogue and serial digital video cable and allow transmission along all installed individual lines of at least 1080p signals.

Cables to adhere to no smoke, zero halogen. Jackets constructed from LFH compound; no PVC.

Mounting:

Installed in containment system and/or as equipment interconnect as noted on schematics.

Variants:

The following variants are required:

2.15-WIR-03/C75	75-ohm 12G SDI coaxial cable
Approved:	<i>Belcom HD1000 or equivalent</i>

2.15-WIR-04 INSTALLED WIRING - LOUDSPEAKER CABLING

Description:

Stranded power cable, suitable for use with audio loudspeakers.

Conductor quantities and sizes as noted below.

Construction:

Individual stranded cores with insulated jacket, or single cores with no outer jacket are acceptable.

Cables to adhere to no smoke, zero halogen. Jackets constructed from LFH compound; no PVC.

Finish:

Different colour PVC jacket for each conductor, same colour code to be utilised on every connector.

Mounting:

Installed in containment system and/or as equipment interconnect as noted on schematics.

Variants:

The following variants are required:

2.15-WIR-04/L44	4no. 4mm ² loudspeaker cable
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Description:

Multimode fibre cabling, class OM4 (50/125), to provide digital audio links compatible with most AES10 (MADI) equipment as well as digital video interfaces.

Fibres to adhere to OM4 standard as specified in ISO/IEC 11801, specifically they shall be graded-index fibres with a core diameter of 50 µm and a nominal cladding diameter of 125 µm.

To be terminated in pairs

The facilities planning schedule lists out the numbers of pairs required on each panel. Where appropriate, fibre cables with a higher number of cores should be used where multiple fibre connections are required, there should also be some redundancy cores in case of damage during installation.

Construction:

Cables to adhere to no smoke, zero halogen. Jackets constructed from LFH compound; no PVC.

Mounting:

Installed in containment system and/or as equipment interconnect as noted on schematics.

Variants:

The following variants are required:

2.15-WIR-06/F42 Multimode fibre cabling, OM4 loose tube. 2-way

2.15-WIR-05 INSTALLED WIRING - WORKLIGHT CONTROL CABLING

Description:

Wiring as required for connecting worklights master and local control panels to central worklights processor. Wiring type will depend upon final system design.

Construction:

To suit contractor system design

Cables to adhere to no smoke, zero halogen. Jackets constructed from LFH compound; no PVC.

Mounting:

Installed in containment system as noted on attached schedules.

Variants:

The following variants are required:

2.15-WIR-05/Z05	Control cable for worklights master panel
2.15-WIR-05/Z09	Control cable for worklights local control panel

2.15-WIR-08 COMBINED PAGING CABLING

Description:

Infrastructure cabling for interconnection of 100V line paging loudspeakers, volume control and relay control.

Construction:

Cables to adhere to no smoke, zero halogen. Jackets constructed from LFH compound; no PVC.

Stranded conductors with jacket

Mounting:

Installed in containment system

Variants:

The following variants are required:

2.15-WIR-08/Z02	Multi core cabling suitable for 100v line paging loudspeakers and relay cabling.
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2.15-WIR-91 INSTALLED WIRING - POWER CABLING

Description:

Power cabling for ELV and 230/400V power circuits within facilities panels.

Construction:

Generally single-core cabling, but multi-core cabling is suggested where groups of circuits are wired to the same destination, and for ELV services.

Mounting:

Installed in containment system as noted on attached schedules, terminated to facility panels and power supplies.

Variants:

The following variants are required:

2.15-WIR-91/P10	Single phase 230V PNE 3-core power wiring for 10A radial relay circuits
2.15-WIR-91/P13	Single phase 230V PNE 3-core power wiring for 13A ring mains/radial circuits
2.15-WIR-91/P16	Single phase 230V PNE 3-core power cabling for 16A radial power circuits
2.15-WIR-91/P32	Single phase 230V PNE 3-core power wiring for 32A radial power circuits
2.15-WIR-91/P60	Single phase 230V PNE 18-core power wiring for 6 x 10A radial relay circuits
2.15-WIR-91/T63	Three phase 415V TPNE 5-core power wiring for 63A radial power circuits

2.15-WIR-92 INSTALLED GPIO CABLING

Description:

Infrastructure cabling for interconnection of outlet boxes and equipment.

Construction:

Cables to adhere to low smoke, zero halogen. Jackets constructed from LFH compound; no PVC.

Mounting:

Installed in containment system as noted on attached schedules.

Variants:

The following variants are required:

2.15-WIR-92/Z11	Cable to link between fire alarm and AV systems
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2.16 Connectors

All interconnect and connector types are specified within the Facilities Planning Schedule – LVC-CBL-SLAV-FPS-003 - included as part of the tender documentation and examples of typical facilities panels are shown on the LVC-CBL-SLAV-AS series of assembly drawings.

Generally, unless stated otherwise; -

- All SL and AV extra-low-voltage connectors are to be from the Neutrik range except where noted on the assembly drawings.
- Fibre connections on facility panels should be D-size panel mount LC type.– Opticalcon connectors are not required on this project.
- All data connectors are to be from the CAT6A Neutrik range (even though they maybe on CAT6 cable) and are to be provided with either punch-down terminations or back-to-back RJ45 sockets at rear – soldering of Category cabling is not acceptable.
- All data and fibre sockets outlets are to be provided with rubber dust caps on short tethering wires fastened to the socket fixing screws.
- All connector that face directly up to be provided with SCF rubber dust caps on short tethering wires fastened to the socket fixing screws.
- All data and fibre sockets are to be black
- All True1TOP, 16A and 32A SPN Ceeform connectors are to be black, and all 13A socket outlets are to be black unless otherwise noted.

2.17 Patchbays & IT equipment

2.17-BPO-01	AUDIO PATCHBAY
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- Description:
- High-density rack-mounted audio jack field suitable for Analogue and AES/EBU digital audio signals.
- Construction:
- Steel or aluminium rack-mount patch panel, U-shaped cross-section with folded lips top and bottom.
 - Panel to be fitted B Gauge jacks and associated labelling strips above each row of connectors.
 - Printed labels for labelling strips to be fitted showing outlet box and facility way numbering including clear indication of any normalling or amplifier input patching.
- Finish:
- High-quality powder-coat finish, colour black. All exposed edges to be smoothed and powder-coated.
- Mounting:
- Mounted in equipment racks and terminated to equipment within the rack and field wiring as noted on attached schedules and drawings.
- Accessories:
- Where inter-rack or internal equipment to be terminated allow for balanced XLR or jack connectors as required.
- Variants:
- The following variants are required:

2.17-BPO-01/048	48 B Gauge audio jacks in 1U rackmount frame
Approved:	Mosses and Mitchell/ Contractor nominated

Description:

Rack-mounted patch panel for patching fibre optic signals.

Construction:

Steel or aluminium rack-mount patch panel, U-shaped cross-section with folded lips top and bottom.

Multimode panels to be fitted with duplex OM4 SC chassis connectors,

Associated labelling strips above each row of connectors.

Printed labels for labelling strips to be fitted showing outlet box and facility way numbering.

Finish:

High-quality powder-coat finish, colour black. All exposed edges to be smoothed and powder-coated.

Mounting:

Mounted in equipment racks and terminated to equipment within the rack and as noted on attached schedules and drawings.

Variants:

The following variants are required:

2.17-FIB-01/024	1U panel with 24no. duplex LC OM4 fibre ways. (Blank inserts may be fitted if not all sockets are required)
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Description:

Rack-mounted patch panel for patching video signals up to 12G SDI.

Construction:

Steel or aluminium rack-mount patch panel, U-shaped cross-section with folded lips top and bottom.

Panel to be fitted with 2 rows of 24 MicroMUSA jacks and associated labelling strips above each row of connectors. Jacks to be spaced vertically for use with MicroMUSA U-link connectors.

Printed labels for labelling strips to be fitted showing outlet box and facility way numbering.

Finish:

High-quality powder-coat finish, colour black. All exposed edges to be smoothed and powder-coated.

Mounting:

Mounted in equipment racks and terminated to equipment within the rack and as noted on attached schedules and drawings.

Variants:

The following variants are required:

2.17-MSA-01/048	1U patchbay fitted with 48no. MicroMUSA video jacks
Approved:	Canford 48-4501

Description:

Rack-mounted patch panel for patching loudspeaker amplified audio signals.

Construction:

Steel or aluminium rack-mount patch panel, U-shaped cross-section with folded lips top and bottom.

Panel to be fitted with 12 x Neutrik NL4 connectors on a 1U strip and associated labelling strips above each row of connectors.

Printed labels for labelling strips to be fitted showing outlet box and facility way numbering or amplifier outlet.

Finish:

High-quality powder-coat finish, colour black. All exposed edges to be smoothed and powder-coated.

Mounting:

Mounted in equipment racks and terminated to equipment within the rack and field wiring as noted within schedules and drawings.

Accessories:

Allow for internal L44 wiring (described elsewhere) terminated in NL4 loudspeaker cable connectors for connection to internal amplifiers, including spare ways, in enough length and quantity as required and described in Section 3 or to internal DIN rail for connection of field wiring.

Variants:

The following variants are required:

2.17-NL4-01/112 1U panel with 12no. NL4-MP loudspeaker connectors

Description:

Rack-mounted patch panel to accommodate D-series connectors.

Construction:

Steel or aluminium rack-mount panel, with 16no. cut-outs per unit row and mounting holes for Neutrik D-shell connectors. U-shaped cross-section with folded lips top and bottom.

Panel to be fitted with Neutrik connectors as noted below and associated labelling strips above each row of connectors to allow for presenting of field wiring and local rack equipment connections.

Printed labels for labelling strips to be fitted above each socket showing outlet box and facility way numbering.

Panels to be provided with tiebars on rear to secure site cabling.

Back-to-back, punch down or crimp terminations to be used.

5-pin XLR and EtherCon connectors to use IDC or back-to-back connections – fully compatible with field wiring.

Finish:

High-quality powder-coat finish, colour black. All exposed edges to be smoothed and powder-coated.

Mounting:

Mounted in equipment racks and terminated to equipment within the rack and as noted on attached schedules and drawings.

Variants:

The following variants are required:

2.17-PPD-00/32X	2U patchbay with 32no. 24mm circular panel cut-outs. Fitted with XLR-5F panel sockets and XLR-5M panel plugs and labels.
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Description:

Rack-mounted patch panel to accommodate D-size connections such as HDMI, USB-A, USB-C, Firewire and any other connector type that is not already accommodated on patchbays listed elsewhere.

Construction:

Steel or aluminium rack-mount panel, with 12no. cut-outs per unit row and mounting holes for D-size connectors. U-shaped cross-section with folded lips top and bottom.

Panel to be fitted with connectors as required and associated labelling strips above each row of connectors to allow for presenting of field wiring and local rack equipment connections.

Printed labels for labelling strips to be fitted above each socket showing outlet box and facility way numbering.

Panels to be provided with tiebars on rear to secure site cabling.

Back-to-back, punch down or crimp terminations to be used.

Finish:

High-quality powder-coat finish, colour black. All exposed edges to be smoothed and powder-coated.

Mounting:

Mounted in equipment racks and terminated to equipment within the rack and as noted on attached schedules and drawings.

Variants:

The following variants are required:

2.17-RP1-01/012	1U Panel custom for termination of USB, HDMI and similar connections within AV Racks.
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Description:

Gigabit Layer 3 Ethernet switch, specifically intended for the distribution of audiovisual and stagelighting Ethernet data, providing Power-over-Ethernet, as an integral function, or via a separate PoE unit, sized as required for end devices included elsewhere in this specification calling for PoE.

Managed switches to be configured with option for setting of VLAN and control of network traffic as the system design requires.

Netgear AV range preferred

Construction:

1U rack mounted case fitted with RJ45 connectors on front panel.

Fitted with LC fibre ports when denoted in variants.

Finish:

As supplied.

Mounting:

Installed within equipment racks as shown on AS rack drawings.

Accessories:

Rack-mounting brackets. Multimode Fibre SFP and fibre optic LC patch cable, where noted on the variant.

Variants:

The following variants are required:

2.17-NSW-RK/O12	Managed Layer 3 Ethernet switch, 12no. 1G ports with PoE+ 480W, 1 x Multimode SFP+ transceiver module.
2.17-NSW-RK/N24	24 Port Layer 3 managed Cat6 switch POE+ 30W per port NO SFP Uplinks
2.17-NSW-RK/M24	24 Port Layer 3 managed Cat6 switch POE+ 30W per port + 2x GbE SFP Uplinks
2.17-NSW-RK/U24	24-port unmanaged Gigabit Ethernet switch unit, providing Power-over-Ethernet.

Description:

Rack-mounted patch panel for patching CAT6 Ethernet data signals.

Construction:

Steel or aluminium rack-mount panel. U-shaped cross-section with folded lips top and bottom.

Panel to be fitted with screened RJ45 Ethernet connectors and associated labelling strips above each row of connectors to allow for presenting of field wiring and local rack equipment connections.

Printed labels for labelling strips to be fitted showing outlet box and facility way numbering.

Connectors to be fully compatible with field wiring.

Finish:

High-quality powder-coat finish, colour black. All exposed edges to be smoothed and powder-coated.

Mounting:

Mounted in equipment racks and terminated to equipment within the rack and as noted on attached schedules and drawings.

Variants:

The following variants are required:

2.17-PPE-00/U48	2U panel with 48no. RJ45 UTP connectors over 2 rows
2.17-PPE-00/U24	1U panel with 24no. RJ45 UTP connectors over 2 rows
2.17-PPE-00/F24	1U panel with 24no. RJ45 FTP connectors over 1 row

Description:

Gigabit Ethernet switch, specifically intended for the distribution of stagelighting Ethernet data, providing Power-over-Ethernet, either as an integral function, or via a separate PoE unit, sized as required for end devices included elsewhere in this specification calling for PoE.

Construction:

1U rack mounted case fitted with RJ45 connectors on front panel.

Finish:

As supplied.

Mounting:

Installed within equipment racks as shown on AS rack drawings.

Accessories:

Rack-mounting brackets.

Variants:

The following variants are required:

2.17-NSW-RK/U24	24-port unmanaged Gigabit Ethernet switch unit, providing Power-over-Ethernet.
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2.5 Stagelighting custom-manufactured items

2.51-FPS-SL	FACILITY PANELS
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Description:

Back-box and faceplate, together forming a facilities panel for connection of stagelighting equipment.

Construction:

Back-box shall be manufactured from 1.6mm thickness mild steel.

Provide fixing points on rear of back-box for fixing to walls. Where the box is to be flush-mounted into the wall or other bespoke fixing, provide additional fixing points as necessary to facilitate installation.

Faceplate shall be manufactured from a minimum 1.6mm thickness mild steel. All faceplate mounting screws and fixing holes shall be countersunk to provide a flat faceplate appearance. Raised or round-headed mounting screws will not be accepted. All screws securing faceplate and connectors must be black. Maximum distance between screws attaching faceplate to back-box shall not exceed 120mm.

The faceplate fixing shall incorporate a piano hinge down one side, so that the faceplate can be swung open for installation and maintenance.

All facilities to be identified with engraved Traffolyte labelling using Arial font. Engraving and finishes to be of high quality. Uneven engraving and/or fill quality will not be accepted. Labels to be constructed from 2mm thick black Traffolyte label with 45-degree bevelled edges. Labels to be securely fixed to the faceplate with black-headed countersunk screws or rivets and present a high-quality finished appearance.

Labelling shall be subject to specific approval at design stage.

Interior of back-box shall be clearly marked with an orientation label to ensure correct first-fix installation.

All LV facilities (including relay circuits) to be wired with appropriately rated, labelled, segregated DIN rail terminals mounted to back-box to facilitate straight-forward termination to incoming supplies. Incoming supplies will be terminated to these DIN terminals by the SSC.

True1TOP, 13A and 16A socket outlets shall be black colour where boxes are black. Where boxes are an alternative RAL colour specified by the client, the colour of the sockets will be chosen by the client and Theatre Consultant, according to the RAL colour specified.

Back-box to incorporate means of connection of CPC(s) to back-box metal work. Face-plates to have wired/braided CPC link to back-box.

Where facilities boxes are surface-mounted in a stage area, each back-box shall incorporate an earth stud – an M8 brass bolt 25mm long secured to the box with plain washer, spring washer & nut for connection of external earths. Each stud shall be fitted with two additional plain washers, spring washer and nut for the connection of external wiring. Connection to the box through to the outgoing DIN rail terminal to be earth bond tested so as to certify that the connection is not affected by paint finish etc. Earth stud shall be labelled and positioned in such a way as to allow easiest access for each particular back-box location.

External tie-bars to be provided top and bottom running the width of the box as shown on the AS series drawings. Rail diameter to be 7.5mm; with radiused returns and secure mounting.

Internal tiebars to be fitted to rear of faceplates to secure site cabling and reduce pull on rear of data sockets as faceplate is opened and closed.

Low smoke and fume cable types to be used for all for internal wiring.

As far as possible, boxes shall be kept as single-phase boxes, so that circuits within connected multicore cables are on a single phase. Where this is not possible, 400V warning labels to be fitted to front of box.

Finish:

Custom paint finish for back-boxes and faceplates to be semi-gloss black, or alternative RAL colour(s) as specified by the client - refer to FPS for details.

Mounting:

Back-boxes shall be purchased by the SSC for fixing and integration with containment.

Boxes are to be surface-mounted, recessed or flush-mounted as indicated on the GA drawings and Facilities Planning Schedule. Where boxes are to be flush-mounted, the faceplates shall overlap the backbox by 20mm all round, as shown on the AS drawing series.

Variants:

All boxes shall be as drawn on the AS drawing series, with 150mm deep backboxes:

2.51-FPS-SL/001	46no. socket outlet boxes with custom faceplates as described in Facilities Planning Schedule, for Main Theatre.
2.51-FPS-SL/EXI	Remove any existing Facilities boxes, face panels, back boxes and associated equipment not required and dispose/recycle as instructed by client – Main Theatre

2.51-FPS-RW	CUSTOM SOCKET 'RACEWAY'
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Description:

A custom length of 100x100mm trunking, fitted with stagelighting dimmer, relay and power sockets for the connection of loose stagelighting fixtures.

Construction:

Back box shall be standard 100x100mm electrical trunking, with end caps and straps. Each section of lid shall be securely safety-strapped to the trunking, so that it can hang on its straps when removed for maintenance.

The raceways may be broken down into smaller sections for delivery and joined on site.

Sockets and labels shall be fitted to the raceway, as indicated on the AS drawings.

All facilities to be identified with engraved Traffolyte, as for the Facility panels above. Labelling and layout of sockets shall be subject to specific approval at design stage.

Interior of raceway shall be clearly marked with an orientation label to ensure correct first-fix installation.

Interior of raceway to incorporate means of connection of CPC(s) to raceway metal work. Raceway lid to have wired/braided CPC link to backbox.

Finish:

Raceway and lid to be finished in semi-gloss black, or RAL colour as specified by the Architect and noted in the FPS.

All socket outlets shall be black colour where raceways are black. Where boxes are an alternative RAL colour specified by the Architect, the colour of the sockets will be chosen by the Architect and Theatre Consultant, according to the RAL colour specified.

Mounting:

Raceway back-boxes shall be supplied by the SSC for fixing, integration with containment system and cabling.

Variants:

The following variants are required:

2.51-FPS-RW/001	3m long custom raceway for Theatre lighting bridges – Various single outlets – See Drawing LVC-CBL-SLAV-AS-010
2.51-FPS-RW/EXI	Remove any existing socket raceways, face panels, back boxes and associated equipment not required and dispose/recycle as instructed by client – Main Theatre

Raceways must be coordinated with site measurements and be custom manufactured following approval of assembly drawing by Theatre Consultant.

Description:

Custom power supply panel offering a range of different sized connectors for the connection of temporary equipment.

Construction:

Panel is to be fabricated from zintec coated steel, designed to be wall-mounting.

Each section of sockets or control devices is to have its own removable front panel for access.

All MCBs are to be 2-pole or 4-pole as detailed below.

Incoming supply to be fitted with neon lamps to indicate status of power supply.

Larger panels - Incoming protection via 4P isolator and overall digital multimeter. The metering shall display all functions, Volts, Amps, KWh, KVA and for all phases.

Internal panel cables up to 63A are to be Tri-rated cables, while 125A and over are to be double insulated tails. Circuit protection devices are to be standard MCBs up to 125A, and MCCBs above that rating.

All CEEform sockets are to be mounted to the front panel.

Powerlock connectors can be mounted to the front panel.

The variable time and sensitivity earth leakage relays are to allow adjustment of trip current and time dependent upon the devices connected and is to be mounted inside the panel to restrict unauthorised access.

All sockets and MCBs to be identified with engraved Traffolyte labelling using Arial font. Engraving and finishes to be of high quality. Uneven engraving and/or fill quality will not be accepted. Labels to be constructed from 2mm thick black Traffolyte label with 45-degree bevelled edges. Labels to be securely fixed to the panel with black-headed countersunk screws or rivets and present a high-quality finished appearance.

Panel must be custom manufactured following approval of assembly drawing by Theatre Consultant.

Finish:

Custom paint finish for power panel to be semi-gloss black.

Mounting:

Panel is to be provided by the SSC for wall-mounting, termination and integration with containment.

Interior of back-box to be clearly marked with an orientation label to ensure correct first-fix installation.

Variants:

The following variants are required:

- | | |
|-----------------|--|
| 2.51-CBL-PP/001 | <p>ES-SL-002 - Type SL1 custom 400A power panel, comprising:</p> <ul style="list-style-type: none"> • 400A 4P isolator • 1 set 200A custom Powerlock connectors, with 4P MCCB, fitted with shunt trip operated by variable time and sensitivity earth leakage relay. • 2no. 125A CEE17 TPN socket, protected by 2no. 125A 4P MCB fitted with shunt trip operated by variable time and sensitivity earth leakage relay. • 2no. 63A CEE17 TPN socket, protected by 2no. 63A 4P MCB fitted with shunt trip operated by variable time and sensitivity earth leakage relay. • 1no. 32A CEE17 TPN socket, protected by 32A 4P 30mA RCBO. • 1no. 16A CEE17 TPN socket, protected by 16A 4P 30mA RCBO. |
|-----------------|--|

2.51-CBL-PP/003	ES-SL-001 - Type SL3 custom 200A power panel, comprising: • 200A 4P isolator • 1 set 200A custom Powerlock connectors, with 4P MCCB, fitted with shunt trip operated by variable time and sensitivity earth leakage relay. • 1no. 125A CEE17 TPN socket, protected by 125A 4P MCB fitted with shunt trip operated by variable time and sensitivity earth leakage relay. • 1no. 63A CEE17 TPN socket, protected by 63A 4P MCB fitted with shunt trip operated by variable time and sensitivity earth leakage relay. • 1no. 32A CEE17 TPN socket, protected by 32A 4P 30mA RCBO.
2.51-CBL-PP/008	ES-AV-001 - Type AV1 custom 125A power panel, comprising: • 125A 4P isolator • 4no. 63A CEE17 TPN socket, protected by 4no. 63A 4P MCB fitted with shunt trip operated by variable time and sensitivity earth leakage relay. • 3no. 32A CEE17 SPN socket, protected by 32A 3P 30mA RCBO.
2.51-CBL-PP/EXI	Remove any existing power panels, face panels, back boxes and associated equipment AS DIRECTED and dispose/recycle as instructed by client – Main Theatre

2.52 Relays and switching

2.52-IRR-36	SWITCH RELAY RACKS
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Description:

- Compact, convection-cooled, wall-mounted 3-phase relay switch pack.
- Each 10A channel to have neutral-disconnect short-circuit protection per-channel.
- RCD protection provided across groups of 4 channels.
- Rack to accept DMX512 control signals and should allow individual DMX addressing per-channel.
- ThruPower racks - each channel can be independently selected to be operated either as a dimmer or a relay, controlled by the DMX signal, as required.
- Dimmer and relay circuit bypassable per channel to allow for constant power operation.
- Dimmers to be minimum 96% efficient.

Construction:

- The rack is to be robustly manufactured in steel and be supplied with all necessary internal cable management. The rack is to provide top and bottom cabling access and front access to wiring and terminations.
- The unit shall be CE compliant.

Finish:

- Standard manufacturer's finish.

Mounting:

- Wall-mounted. Location as shown on GA-series drawings.

Accessories:

- Supplied with all necessary mounting hardware.
- To include initial commissioning and configuration.

Variants:

The following variants are required:	
2.52-IRR-36/F24	24-channel 10A-RCD/4 ND DMX or sACN controlled relay panel for production power (SLD-101 to 109)
Approved:	<i>Foundry Switch Panel Connect 24-channel 7122A1035</i>
2.52-IRR-36/R24	Wall-mounted relay ONLY rack. 24no. 10A ways with RCBO per way for White Worklights (WLR-101/WLR-102)
Approved:	<i>Vari-Lite - Rig Switch+ 24way 10a Switched relay panel</i>
2.52-IRR-36/EXI	Remove existing dimmer racks as indicated and dispose/recycle as instructed by client
2.52-IRR-36/WXI	Remove existing AMX relay racks and dispose/recycle as instructed by the client. Adapt current White Worklight connections to new relay rack WLR-101.

2.53 Stagelighting control systems

2.53-MSS-OP DMX DATA DISTRIBUTION AMPLIFIER

Description:
Optically-isolated, DIN-rail mounted amplifier unit specifically intended for the distribution of stagelighting DMX data.

Construction
Moulded plastic enclosure to fit DIN rail.
All inputs and outputs to be on header units.

Finish:
Standard, as supplied.

Mounting:
DIN rail mounted in rear of equipment racks

Accessories:
Termination accessories and power supplies.

Variants:
The following variants are required:
2.53-MSS-OP/106 Optically-isolated DMX distribution unit with 1 input, and isolated outputs, to fit DIN rail.
Approved: *Artistic Licence Rail-Split RDM*

2.53-MRG-RK DMX DATA MERGE UNIT

Description:
Rack mounted DMX Merge unit specifically intended for the merging of stagelighting DMX data. Unit must have the ability to merge Four DMX Inputs to Two output data streams. Each input should have its own offset so data channels can be set end to end or overlapped. When using the offsets any channels over the 512 limit are carried over to output two. The unit should enable the user set to hold last frame on any or all of the inputs in the event of data loss.

Construction
Robust metal construction with XLR-5PIN Male and female connectors on the front panel.

Finish:
Standard, as supplied.

Mounting:
19" 1U Rackmount

Accessories:
Termination accessories and power supplies.

Variants:
The following variants are required:
2.53-MRG-RK/004 DMX merge unit with 4 inputs, and 2 outputs, rack mounted.
Approved: *XTBA Smart Merge 4:2*

2.53-MSS-RK DMX DATA DISTRIBUTION AMPLIFIER

Description:

Buffered amplifier unit specifically intended for the distribution of stagelighting DMX data.

Construction

1U rack-mounting steel case fitted with front panel connectors.

All inputs to be terminated with XLR-5M connectors.

All outputs to be terminated with XLR-5F connectors.

Finish:

Standard black, as supplied.

Mounting:

Mounted in equipment racks as shown on AS drawings.

Accessories:

Rack-mounting brackets.

Variants:

The following variants are required:

2.53-MSS-RK/010	DMX distribution unit with 1 input, 1 loop output and 10 isolated outputs, rack-mounted, front panel sockets.
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2.53-NDE-PT PORTABLE DMX/ETHERNET GATEWAY NODE

Description:

Portable Ethernet/DMX Gateway nodes, fully compatible with sACN, DMX and RDM lighting data protocols. Options for input or output signals as outlined below with ability to be securely hung on lighting rigging

Construction

Full metal construction with front facing control panel. Input/output connectors as outlined below.

Finish:

Standard black, as supplied.

Mounting:

Portable unit, mounted in position as required.

Accessories:

Standard metal G-Clamp, captured Ethernet CAT6A Cable, Correctly rated safety bond.

Variants:

The following variants are required:

2.53-NDE-PT/FSI	Touring gateway, DMX in, Two port 5-PIN XLR Male panel mount connectors, Ethernet RJ45 panel mount connector with G-clamp and safety bond – Black
Approved:	ETC Portable Two Port Input Gateway RSN-DMX2-I-P
2.53-NDE-PT/FSO	Touring gateway, DMX out, Two port 5-PIN XLR Female panel mount connectors, Ethernet RJ45 panel mount connector with G-clamp and safety bond – Black
Approved:	ETC Portable Two Port Output Gateway RSN-DMX2-I-O

Description:

Stagelighting network data distribution device. The node shall provide 2048 DMX input or output channels over four DMX output ports to DMX512-A standard.

The front of the unit shall present indication of power, network activity, DMX port configuration and DMX port activity. The unit shall be provided with 4 optically-isolated DMX ports, which shall be configurable for either input or output, and it shall be possible to employ 4 universes of DMX simultaneously.

The node shall be freely-configurable by the user and this configuration data shall be stored in a non-volatile memory. The unit shall allow connection to a standard Ethernet network.

The unit shall be fully CE compliant and shall utilise PoE (Power-over-Ethernet).

Construction:

All unit electronics and interface connectors shall be housed within a steel enclosure sized to fit within 1U of a standard 19" rack.

The unit shall be provided with 4no. XLR-5 connectors for input/output of DMX and 1no RJ45 connector for interface with standard Ethernet network. All connectors shall be presented on the front of the unit.

Mounting:

Installed within equipment racks as shown on AS-series drawings.

Accessories:

All necessary bracketry for installation within a standard 19" rack, including any accessories required to present all inputs and outputs on the front panel.

Variants:

The following variants are required:

2.53-NDE-4P/RMO	Rack-mounted 4-port Ethernet node
Approved:	<i>ETC RSN-DMX4-O with front panel kit N34G-FP4F and rack-mount</i>

Description:

The current paradigm system processor is currently housed in a small wall mounted rack at high level in the rack room, controlling the houselights only. This needs to be removed and re-installed within the Stagelighting data rack (SLR-101) in the same room. All existing connections to the houselight system must be fully restored and working in the new rack.

The worklights control processor shall provide logic processing for the worklight and houselight control system. It shall receive input signals from all master control panels and worklight control switches and shall provide control outputs to all worklight control button indicators, worklight master panel indicators, worklight circuits and houselight circuits.

The worklights control processor shall be capable of controlling any dimmer or relay. Control signals to operate dimmers and relays shall combine with any other signal received by the dimmer/relay racks on a highest-takes-precedence basis. Control signal levels for each dimmer or relay shall be able to be manually set using the worklight control.

The system shall provide a number of houselight presets and worklight presets which shall be easily re-recorded by the end user. The system shall be programmable on-site and shall have a means of removable storage of programme information.

Construction:

Modular case fitted with rear terminals for connection of control input and output wiring.

Finish:

As supplied. Front panel to give a neat and finished appearance when installed.

Mounting:

Installed within floor-mounted cabinet.

Accessories:

Rack-mounted plug-in enclosure; all associated remote station power supplies and interfaces required.

Include for the development of the system configuration in conjunction with both Client and Theatre Consultant, and for all logic programming and set-up of system.

Variants:

The following variants are required:

2.53-WKL-CP/EXI	Move paradigm control processor from exiting rack to new stagelighting rack (SLR-101) maintaining existing control links with houselight system.
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2.53-WKL-PP WORKLIGHT CONTROL SYSTEM CONFIGURATION AND PROGRAMMING

Description:

Include for the development of the system configuration and touch screen layouts in conjunction with both Client and Theatre consultant, and for all logic programming of system.

This should include for an initial meeting with the client to develop the system criteria, as well as a demonstration to the client and theatre consultant of a working development version of the configuration, at least 4 weeks prior to installation on site.

The configuration should include pages for (as a minimum) – mode setting, houselight groups, houselight presets, white worklight circuits, blues worklight circuits, worklight presets, stagelighting circuits, stagelighting presets, non-dim presets, recording, etc.

Variants:

The following variants are required:

2.53-WKL-PP/C01	Worklight control system configuration & programming – Main Theatre
-----------------	---

Description:

A custom-manufactured panel providing a user interface for the worklights control processor described above.

Panel shall incorporate a 7" colour touchscreen as shown on the project AS-series drawings. The screen shall have a 'sleep' function and proximity sensor.

All operating functions shall be achieved using soft buttons and faders on the touchscreen. There shall be screens for the control of houselights, worklights and stagelighting as well as other building functions that the Client defines, that may be controlled via the four, built-in contact-closures in the central processor.

The installed master panels and portable units shall incorporate a 'RECORD' function which will allow the end user to easily re-programme some or all of the presets by taking a 'snapshot' of the system and applying it to the next selected preset button.

Virtual buttons shall become 'illuminated' when the preset or circuit is active on all connected panels regardless of which one has been operated.

The system configuration shall be developed in good time in advance of installation on site. In particular, the configuration of the system shall be demonstrated to the Client and Theatre Consultant at least four weeks prior to installation, using an off-line editor software package on a laptop, so that any requested changes to the configuration can be implemented in advance of installation on site.

Construction:

Faceplate shall be manufactured from 1.6mm steel. Touchscreen shall be suitable for heavy-duty use over an extended period and shall be mounted securely on faceplate.

All faceplate mounting screws and fixing holes shall be countersunk to provide a flat faceplate appearance. Raised or round-headed mounting screws will not be accepted. Maximum distance between screws attaching faceplate to backbox shall not to exceed 120mm.

General size and appearance shall be as per project AS-series drawings.

Finish:

Paint finish for back-boxes and faceplates to be RAL colour as specified by the Architect.

Any labelling shall be subject to final approval by the Client / Theatre Consultant.

Mounting:

Backboxes to be for surface-mounted or flush-mounted installation as indicated on drawings.

Backbox to be free issued to Electrical Contractor for surface or flush wall-mounting.

Termination and installation of faceplate is in this contract.

Accessories:

Include for the creation of touchscreen layouts in conjunction with both Client and Theatre Consultant, and for all logic programming of system.

Variants:

The following variants are required:

2.53-WKL-MP/001 Worklights master panel

Approved: *ETC - P-TS7-4 plus custom backbox*

Description:

A portable desk-top control panel providing a user interface for the worklights control processor described above. The unit shall be a standard product from the same manufacturer as the control processor.

Panel shall incorporate a 7" colour touchscreen as shown on the project AS-series drawings. The screen shall have a 'sleep' function and proximity sensor. This unit should have a rechargeable battery power supply which charges while sitting in it's docking station, making it fully portable when removed from the dock.

This units functionality should match that of the master control panels above (2.53-WKL-MP/001)

Construction:

As standard, with 5m attached cable.

Finish:

Black, as standard.

Mounting:

Portable, on desk-top.

Accessories:

Wifi Charging docking station from same manufacturer.

Variants:

The following variants are required:

2.53-WKL-PO/P01 Portable worklights control panel

Approved: *ETC HANDHELD P-TS7-H with P-LCD-DOCK Docking station.*

Description:

Custom push-button panel for connection to worklights control processor to provide signal for simple logic control.

Panel to comprise a number of non-latching vandal-proof pushbuttons with LED indicators housed within buttons, as shown on the project AS-series drawings.

Buttons to be intended for heavy-duty use over an extended period, and to be mounted securely on faceplate.

The pushbutton is intended to provide local control of individual circuits but shall be capable of other programmed tasks if so desired. The pushbutton can be disabled from the master control panel and the LED shall be programmed in such a way that it can reflect when the button is available for use and the status of the circuit:-

Off = circuit unavailable / system in 'NIGHT'.

Blue / White = local circuit OFF - button colour indicates the colour of the fittings that will turn ON when pressed.

Red = local circuit ON - button colour indicates that lights will go OFF when pressed.

Construction:

Faceplate and steel backbox fitted with pushbuttons. Faceplate to be of standard UK 2-gang switch size.

Finish:

Faceplates within stage, backstage and technical areas shall be surface mounted and finished in RAL semi-gloss colour to be specified by the client.

Backboxes must be designed to match the faceplates - in particular the faceplates must not overlap a surface-mounted backbox and the corner radiusing on panel and backbox must match.

Mounting:

Backboxes to be for surface-mounted or flush-mounted installation as indicated on drawings. Termination and installation of faceplate is in this contract for the specialist contractor.

Variants:

The following variants are required:

2.53-WKL-PB/002	Worklights local control panel – 2 button panel
2.53-WKL-PB/004	Worklights local control panel - 4 button panel

Description:

Standard grid system light switch or dimmer switch wiring accessory faceplate and back box for control of power to worklight fittings in control rooms and stage areas.

Switches and dimmer switch to be physical levers, faders or rotary controls, mechanically-operated, not electronic touch-sensitive panels.

Dimmer switch to be compatible with the ceiling-mounted lighting tracks listed later in this specification.

Finish:

To match general standard of electrical wiring accessories across the project.

Backboxes must be designed to match the faceplates - in particular the faceplates must not overlap a surface-mounted backbox and the corner radiusing on faceplate and backbox must match.

Switch plates to be labelled with engraved traffolyte to match Facility panels.

RAL colour to be specified by the architect.

Mounting:

Backboxes to be surface-mounted. Backbox to be free issued to EC.

Variants:

The following variants are required:

2.53-WKL-SS/D01 Worklights dimmer switch – single circuit.

2.53-WKL-SS/S01 Worklights switch – single circuit.

Approved: *MK Gridswitch*

2.54 Stagelighting cabling and adapters

2.54-GFC-01 DMX INTERCONNECTION CABLE

Description:

Flexible cable for DMX data transmission use.

Construction:

2no. pairs of 0.75mm² stranded twisted cables with overall screen in coloured jacket, terminated with 1no. XLR-5M and 1no. XLR-5F connector. No PVC.

Finish:

Jacket colour as below.

Mounting:

Patch cables to be fitted to patch panels.

Platform lighting cables to be installed with the fixtures.

Variants:

The following variants are required:

- | | |
|-----------------|---|
| 2.54-GFC-01/003 | DMX data patch cable, length 300mm - colour red |
| 2.54-GFC-01/006 | DMX data patch cable, length 600mm - colour red |

2.54-HFC-01 ETHERNET INTERCONNECTION CABLE

Description:

Flexible cable for Ethernet data transmission use.

Construction:

CAT 6 UTP flexible cable in coloured jacket.

Patch cables to be terminated with RJ45 connectors.

Finish:

Jacket colour as below.

Mounting:

Patch cables to be fitted to patch panels.

Variants:

The following variants are required:

- | | |
|-----------------|--|
| 2.54-HFC-01/003 | Ethernet data patch cable, length 300mm - colour red |
| 2.54-HFC-01/006 | Ethernet data patch cable, length 600mm - colour red |

2.55 Luminaires and accessories

2.55-WKL-BL POWER SUPPLY FOR BLUE WORKLIGHT FITTINGS

Description:

Rack-mounted power supply for low-voltage Blue LED work light fixtures.

Rack-mounted PSU to be a 6-zone version with DMX input - each zone is to be individually controlled by a separate channel on the DMX-512 signal input and support up to 12 fittings.

Front panel to incorporate indication of the status of each zone.

Construction:

2U rack-mounting steel case or wall-mounted steel case.

Finish:

As supplied. Front panel to give a neat and finished appearance when installed.

Mounting:

Installed with rack mountings within floor-mounted cabinet.

Accessories:

Included power cable

Variants:

The following variants are required:

2.55-WKL-BL/PS6	6-zone rack-mounted power supply for Blues LED fittings with DMX input.
Approved:	ETC BS6PS6RDA.

2.55-BLU-WL SINGLE-CELL BLUE LED WORKLIGHT FIXTURE

Description:

A high performance low-voltage directional blue LED fitting designed for mounting direct to conduit box.

Construction:

The unit is to be constructed from UV-stable polycarbonate, IP67 rated.

Mounting:

Installed to soffit-mounted or wall-mounted circular conduit boxes, in locations shown on GA drawings.

These fixtures are to be free-issued to the EC for installation, but commissioning, configuration and fitting of cowls are part of this package.

Accessories:

Cowl accessory – black.

Cowls are to be retained by the SSC until installation is complete – install cowls during witness testing process.

Variants:

The following variants are required:

2.55-BLU-WL/20B	Low-voltage blue LED beam fixture – Type B – 20 deg with cowl
Approved:	ETC BSDBF + BSC
2.55-BLU-WL/DME	Low-voltage blue LED dome fixture – Type E – frosted with eyelid accessory.
Approved:	ETC BSDBF + BSEL

2.55-WKL-TR CONTROL ROOM LIGHTING TRACK AND SPOTLIGHTS

Description:

A length of standard lighting track, with spotlights and dimmer control, intended as a kit for control room lighting.

Spotlights to be 3000K, smoothly dimmable to zero.

Finish:

Standard black finish

Mounting:

This lighting track is to be free-issued to the Electrical Contractor for installation.

Variants:

The following variants are required:

2.55-WKL-TR/004	Short length of lighting track, black finish, with 4no. dimmable spotlights
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Approved: *Design 360*

2.55-REF-SS REFURBISHMENT OF VENUE CYMRU FIXTURES

Description:

There are a number of original fixtures that will be identified by the Venue Cymru team before the site is handed over to the contractor. These fixtures are to be removed by the specialist contractor, refurbished with new LED sources, and then re-installed on site, as directed by the client.

Fly ropes lights – a number of linear fixtures, originally designed by Carr & Angier, to be re-installed butting together in a line above the fly ropes on the fly gallery, along with a local dimmer control.

Silence signs – a number of illuminated signs around the backstage area of the main theatre, to be controlled by the worklight system.

Variants:

The following variants are required:

2.55-REF-SS/FLY	Fly ropes lights as directed by the client
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2.55-REF-SS/SIL	Silence signs as directed by the client
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2.6 AUDIOVISUAL EQUIPMENT

2.61 Audiovisual custom-manufactured items

2.61-FPS-AV	AUDIOVISUAL / STAGELIGHTING FACILITIES PANEL, AV POWER OUTLETS, LOUDSPEAKER CONNECTIONS, BACK-BOXES AND FACEPLATES
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In this project, all stagelighting and audiovisual ELV services are combined in a single facility panel. Audiovisual power outlets are separate and can be ‘off the shelf’ metal clad 13A outlets rather than custom panels. See assembly drawings for more details.

As part of this tender – all existing facility panels and installed cabling are to be removed and recycled if they are not required by the client.

Description:

Custom back-box and faceplate forming a facilities panel for connection of equipment.

Construction:

- Back-box to be manufactured from 1.6mm thickness mild steel.
- Provide fixing points on rear of back-box for fixing to walls. Where the box is to be flush-mounted into the wall or other bespoke fixing, provide additional fixing points as necessary to facilitate installation.
- Faceplate shall be manufactured from 1.6mm thickness mild steel.
- All faceplate mounting screws and fixing holes shall be countersunk to provide a flat faceplate appearance. Raised or round-headed mounting screws will not be accepted.
- All screws securing faceplate and connectors must be black.
- Maximum distance between screws attaching faceplate to back-box shall not exceed 120mm.
- The faceplate fixing shall incorporate a piano hinge on the bottom, so that the faceplate can be swung open for installation and maintenance.
- All facilities to be identified with engraved traffolyte labelling using Arial font. Engraving and finishes to be of high quality. Uneven engraving and/or fill quality will not be accepted.
- Labels to be constructed from 2mm thick black traffolyte label with 45-degree bevelled edges.
- Labels to be securely fixed to the faceplate with black-headed countersunk screws or rivets and present a high-quality finished appearance.
- Labelling shall be subject to specific approval at design stage. Manufacturer’s logos will not be accepted.
- Interior of back-box to be clearly marked with an orientation label to ensure correct first-fix installation.
- External tie-bars to be provided to sides or top and bottom of the box as indicated in the assembly drawings. Rail diameter to be 7.5mm; with radiused returns and secure mounting. Internal tiebars to be fitted to rear of faceplates to reduce pull on rear of sockets as faceplate is opened and closed.
- Extra low voltage AV connectors to be from Neutrik ranges unless otherwise specified in the tender documentation. ALL Data sockets to be fitted with tethered dust caps. Low smoke and fume cable types to be used for internal wiring.

Finish:

Custom paint finish for back-boxes and faceplates to be RAL colour specified to architect’s approval, in a 30% gloss finish.

Mounting:

Back-boxes shall be free-issued to the electrical contractor for fixing and integration with containment.

Boxes are to be surface-mounted or flush-mounted as indicated on the SLAV GA layouts. Where boxes are to be flush-mounted, the faceplates shall overlap the backbox by 20mm all round, as shown on the AS drawing series.

When noted as supplied with fixing in the variant refer to relevant assembly drawing.

Boxes with fixings to attach to pipes will require suitable lengths of black channel fixing fitted with suitably sized U-bolt fixing and bolts to connect to back box – all with locking vibration proof nuts.

Variants:

All boxes shall be as indicated on the AS drawing series:

2.61-FPS-AV1/001	AVSL socket boxes with custom faceplates and RAL colour as described in facilities planning schedule, 57no. boxes of various sizes.
2.61-FPS-AV1/002	Dual 13a socket outlets with USB c connections wired to AV Distribution board. Mounted next to AVSL Facility panels
2.61-FPS-AV1/PAG	Small form factor surface mounted panel for data connections to the paging system.
2.61-FPS-AV1/003	Custom panel with NL4 connection and mounting point for a loudspeaker up to 8kg.
2.61-FPS-AV1/EXI	Remove any existing Facilities boxes, face panels, back boxes and associated equipment not required and dispose/recycle as instructed by client – Main Theatre

Each box must be custom manufactured following approval of assembly drawing by Theatre Consultant.

2.62 Amplifiers

2.62-AMP-DB 4 CHANNEL AMPLIFIER WITH PROCESSOR

Description:

- Type: 4-channel installation amplifier (2 RU height).#
- Networking: Milan-enabled for modern digital audio integration.
- User Interface: Features a 4.3" colour touchscreen for control and monitoring.
- DSP: Includes full DSP capabilities (e.g., 16-band EQs).
- Control: Equipped with GPIOs (8 in / 4 out) and a General Fault contact for system integration.
- Power: 4x900W into 8Ω.

Construction:

- As supplied, with rack-mount case, ears and bolts as required

Mounting:

- Mount in installed equipment rack described elsewhere.

Accessories:

- Power cable. Euro blocks as required. All internal rack wiring to enabling patching, signal and control.

Variants:

- The following variants are required:
 - 2.62-AMP-DB/20D Installation specific four channel amplifier, Maximum output power 4 x 1800/900 W into 4/8 Ω
 - Approved: D&B 25D

Description:

Type: 4-channel installation amplifier (2 RU height).#

Networking: Milan-enabled for modern digital audio integration.

User Interface: Features a 4.3" colour touchscreen for control and monitoring.

DSP: Includes full DSP capabilities (e.g., 16-band EQs).

Control: Equipped with GPIOs (8 in / 4 out) and a General Fault contact for system integration.

Power: 4x2000W into 8Ω.

Construction:

As supplied, with rack-mount case, ears and bolts as required

Mounting:

Mount in installed equipment rack described elsewhere.

Accessories:

Power cable. Euro blocks as required. All internal rack wiring to enabling patching, signal and control.

Variants:

The following variants are required:

2.62-AMP-DB/40D Installation specific four channel amplifier, Maximum
output power 4 x 2400/2000 W into 4/8 Ω

Approved: *D&B 40D*

Description:

Type: 4-channel installation amplifier (1 RU height – half width)

Networking: Milan-enabled for modern digital audio integration.

DSP: Includes full DSP capabilities (e.g., 16-band EQs).

Control: Equipped with GPIOs (8 in / 4 out) and a General Fault contact for system integration.

Power: 4x2000W into 8Ω.

Construction:

As supplied, with rack-mount case, ears and bolts as required

Mounting:

Mount in installed equipment rack described elsewhere.

Accessories:

Power cable. Euro blocks as required. All internal rack wiring to enabling patching, signal and control.

Variants:

The following variants are required:

2.62-AMP-DB/O5D	Installation specific high-density four channel amplifier Integrated audio networking Flexible output power sharing 1 RU x 9.5" ultra-compact design
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Approved: *D&B 5D*

2.63 Audio signal processing

2.63-AIP-01	AUDIO INPUT DEVICE
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Description:

Custom made desk mount panel to include the following 3 items

- a 10” Qsys touchscreen
- A music input point with analogue audio input connections (phono and 3.5mm jack) and a Bluetooth connection
- A gooseneck microphone for making paging announcements.

This custom item may require an internal network switch to allow connectivity from a single Cat6 cable. SSC to develop this.

The SSC is to allow sufficient time for programming of the paging core processor which includes the functionality of this device. Coordination with the Theatre Consultant and client must be allowed for to ensure the design operation is consistent with the requirements of the system and that all parts of the system work together as a complete functional system.

Construction:

Custom desk mounted with Cat6A cable connections.

Finish:

RAL 9005, 30% gloss, Panel to be engraved.

Mounting:

Desk mounted, supplied as loose equipment.

Variants:

The following variants are required:

2.63-AIP-01/CUS	Custom paging system interface with bluetooth and analogue audio input connections with touch screen control and paging
Approved	<i>Custom panel with TSC-101-G3 and unD6IO-BT Network audio plate</i>

Description:

Custom made 2-gang faceplate with robust and high quality volume control knob, for use with 100v line signal to adjust the volume of the show relay signal.

Volume restoration level to be set via screw head, no protruding knob or spindle.

Unit to be equipped with suitable relays and control systems to allow system to work fully as per attached system schematics, including volume restoration where noted.

Where fitted, paging bypass switch is required to disconnect paging signal and associated relay switching signal. Or to switch input to signal containing show relay only.

Where the volume control is to serve a zone with multiple amplified feeds this is to be switched prior to the pot for both signal and volume restoration control.

Bypass options where noted in variant to require fish key or similar to activate or engage. Bypass to create a break in signal.

Construction:

2-gang steel box (146mm x 86mm x 50mm) with separate faceplate.

Finish:

RAL 9005, 30% gloss, all knobs and buttons to be black. Panel to be engraved.

Mounting:

Backbox - free issued to electrical contractor for surface or flush wall mounting.

Termination and installation of faceplate is in this contract.

Variants:

The following variants are required:

2.64-IPV-01/001	Type 1 – Volume control for paging and volume control for show relay, show relay ducks on paging call
2.63-IPV-01/01R	Type 1R - Show relay volume control volume restoration when a paging call is made

Description:

A custom manufactured relay interface unit
Controlled via GPIO from the paging processor
Outputs are routed to paging volume controls to swap between show relay audio and paging calls

Construction:

Custom manufactured

Accessories:

Power supply and cabling to connect to infrastructure

Mounting:

Mounted in the rear of the equipment rack as detailed in equipment schedule and assembly drawings.

Variants:

The following variants are required:

2.63-PRI-01/001 *Paging relay interface to change from show relay to paging*

2.63-PSM-06 4-ZONE DANTE PAGING CONTROLLER WITH BUILT IN MICROPHONE

Description:

CB style microphone unit with 4no. paging zone-selection buttons and cat 6A installed connection point.

Paging zone-selection buttons to be illuminated when activated and labelled appropriate zones - in Arial font.

To include “busy” LED when a call is being made from another microphone station.

(units to be compatible with paging system and paging microphone supplied as part of SM desk)

POE capable.

Construction:

Custom backbox required desktop housing with non-slip feet with wall mounting option provided in addition.

Mounting:

Supplied as loose equipment

Accessories:

CAT-6 flexible appliance cable to connect to paging plug-in point.

Variants:

The following variants are required:

2.63-PSM-06/P4X Paging microphone with 2no. zone-selection buttons

Approved: *Alcorn McBride VP4X in custom backbox*

Description:

Unified DSP with 24 local audio I/O channels,
Network I/O, channel count as per variant
Quad LAN ports
8 x GPIO port
Display and USB ports to front of panel
Control capability via touchscreen integration
Network compatible with cinema amplifiers

Construction:

As supplied, with rack-mount cages, ears and bolts as required.

Mounting:

Mounted in equipment racks described elsewhere. All rear panel connections to be landed onto patchbays as described elsewhere.

Accessories:

Power supply cable, rack mounting hardware.

Variants:

The following variants are required:

Approved: *QSC Core 24F*

2.63-RMM-01	ANALOGUE AUDIO MONITOR
-------------	------------------------

Description:

A 2 Channel 1U rackmount audio monitor with integrated loudspeakers and volume controls

Inputs: 2 x XLR 3-pin female, transformer balanced (rear panel)

2 x B-gauge jack sockets, gold plated, transformer balanced (front panel - overrides XLR inputs)

Impedance: 15k ohms approx..

Power: 85 - 240 VAC 15 VA max., IEC 60320 type C14 connector

Construction:

As supplied

Accessories::

Power supply cable and cabling to connect to patchbay infrastructure

Mounting:

Mounted in equipment racks as detailed in equipment schedule and assembly drawings. Rear panel connectors to be landed on patchbays described elsewhere.

Variants:

The following variants are required:

2.63-RMM-01/341	Rackmount 2 channel audio monitor
Approved:	<i>Canford Audio 76-341</i>

2.63-SOF-03	DIGITAL AUDIO LICENSE
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Description:

A perpetual license for the Paging processor, to enable various features in order to support the programming requirements of system design.

Variants:

The following variants are required:

2.63-SOF-03/DAN	Q-SYS Core 32ch Dante Software License, Perpetual
Approved:	<i>Q-SYS QSC SLDAN-32-P</i>

Description:

Touch screen interface for DSP with user interface to control paging system

Touch screen design to incorporate background music control, show relay level adjustments including compression and limiter, paging zone selects, pre-recorded announcement firing.

Construction:

As supplied, with desk mount attachment and 5metre deployable Cat6A cable to connect to infrastructure.

Mounting:

Supplied as loose equipment.

Accessories:

Power supply, data cables for connection to DSP systems.

Tabletop stand accessory where variant requires

Variants:

The following variants are required:

2.63-TCS-01/10W 10" Capacitive LCD touch screen compatible with AV control system. Desk mount with cable

Approved: QSC TSC -101-G3

2.64 Interconnects and interfaces

2.64-AMP-DB AUDIO NETWORK BRIDGE

Description:

Audio network bridge to interface between audio network and non-network audio system equipment e.g. amplifiers.

Audio network protocol, network ports, audio signal I/O type, and audio I/O channel quantity as described in variant.

Construction:

As supplied, with rack-mount case, ears and bolts as required

Mounting:

Mount in installed equipment racks described elsewhere.

Land any rear-facing connections on to patchbays described elsewhere.

Accessories:

Power cable.

All internal rack wiring to enabling patching, signal and control.

Variants:

The following variants are required:

2.64-AMP-DB/DS1	Interface between d&b amplifiers and the Dante audio transport protocol, 16 AES3 digital output channels, 4 AES3 digital input channels, Integrated 5-port network switch
Approved:	<i>d&b audiotechnik DS10</i>

2.64-NL4-01 LOUDSPEAKER CABLING

Description:

Highly flexible rubber coated 4 core loudspeaker cabling for connecting loudspeakers to infrastructure. Selection of cable for use with Monitor loudspeakers, lengths to be discussed with client.

Construction:

4 core 4mm black rubber coated cabling with Neutrik NL4 connectors at either end, supplied with heatshrink for end user to fit cable idents.

Finish:

Jacket colour as below.

Mounting:

To installed loudspeakers and infrastructure.

Variants:

The following variants are required:

2.64-NL4-01/LOT	Rubber cabling with NL4 connections as required to connect all loudspeakers to installed infrastructure
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2.64-PCC-B0 AUDIO PATCH CABLE

Description:

Highly flexible patch cable for balanced audio signal transmission.

Construction:

Pair of 0.75mm² stranded twisted cables with braided screen in overall braided cloth jacket, fitted with GPO jacks at both ends, unless noted in the variants, suitable for use in patchbay as described elsewhere.

Finish:

Jacket colour as below.

Mounting:

Patch cables to be fitted to patch panels.

Variants:

The following variants are required:

2.64-PCC-B0/600	Balanced audio patch cable, length 600mm. Provide mix of two colours – red & blue.
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2.64-PCC-E0 CONTROL DATA PATCH CABLE

Description:

Flexible Cat6A cable for Ethernet data transmission use.

Construction:

CAT 6A FTP high-quality flexible cable in coloured jacket.

Patch cables to be terminated with shielded RJ45 connectors.

Finish:

Blue for intercom, Green for Cuelight, Yellow for Audio / General use, Red for Paging.

Mounting:

Patch cables to be fitted to patch panels, and remainder supplied as loose equipment

Variants:

The following variants are required:

2.64-PCC-E0/30B	Ethernet data cable with RJ45 connectors, length 300mm - Blue
2.64-PCC-E0/30G	Ethernet data cable with RJ45 connectors, length 300mm – Green
2.64-PCC-E0/60Y	Ethernet data cable with RJ45 connectors, length 300 and 600mm - Yellow
2.64-PCC-E0/30R	Ethernet data cable with RJ45 connectors, length 300 Red

2.64-PPC-FO FIBRE OPTIC PATCH CABLE

Description:

Flexible fibre optic patch cable for various digital audio and video interfaces.

Multimode duplex fibres, class OM4, to provide digital audio links compatible with most MADI (AES10) equipment as well as digital video interfaces.

Fibres to adhere to OM4 standard as specified in ISO/IEC 11801, specifically they shall be graded-index fibres with a core diameter of 50 µm and a nominal cladding diameter of 125 µm.

Cables to adhere to no smoke, zero halogen. Jackets constructed from LFH compound; no PVC.

Construction:

As supplied.

Finish:

Colour as supplied.

Mounting:

Fitted in patchbay and supplied as loose equipment.

Variants:

The following variants are required:

2.64-PCC-FO/300	Fibre OM4 duplex patch cable with LC connectors to match patch bay, length 300mm Aqua
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2.64-PCC-LO LOUDSPEAKER AUDIO PATCH CABLE

Description:

Highly flexible patch cable for use with loudspeaker patchbays and facilities boxes.

Construction:

4 core 4mm² stranded twisted cables in overall PVC jacket, fitted with 4-pin Neutrik Speakon connectors at both ends.

Finish:

Jacket colour as below.

Mounting:

Patch cables to be fitted to patch panels.

Variants:

The following variants are required:

2.64-PCC-LO/060	Loudspeaker patch cable with NL4-MC connectors, length 600mm, colour black
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Description:

Flexible co-axial patch cable for up to 12G analogue or serial digital video signal transmission.

Construction:

Single centre conductor with braided screen in overall black PVC jacket, fitted with microMUSA video connector at each end. 300mm length

Finish:

Black jacket with blue boots

Mounting:

Fitted in patchbay or supplied as loose equipment.

Variants:

The following variants are required:

2.64-PCC-VO/300 microMUSA 12G UHD PATCHCORD 300mm, Black.

Description:

A rackmount Windows based PC with separate keyboard and mouse in a rackmount drawer, so that the PC can be operated by a user at the rack.

PC to be used for configuring equipment on the network such as Qsys items, and for monitoring items on the network or for control of specific equipment such as cinema system or PA system – Separate network cards required.

Minimum specification: - may be higher.

240GB Solid state HDD

8GB DDR4 memory

6 Core i5 processor

Windows pro 11 licence

4 x Gigabit LAN controllers

Front access USB socket.

Construction:

2U rack, steel case as supplied

Finish:

As supplied.

Mounting:

Installed in racks

LAN ports from PC to be landed on data patchbay. All other ports to be landed on the 1U 'multi-use' patchbay – described elsewhere.

Accessories:

Rackmount drawer for full size keyboard with sliding extension pad for mouse, a product such as Blackbox RM382-R382 would be suitable. (A keyboard with built-in trackpad is not acceptable)

All cabling to enable connection of the PC to keyboard, mouse, monitor and network

Power supply cable

Variants:

The following variants are required:

2.64-SCP-01/DLL	Micro personal computer for general use in racks with keyboard and mouse drawer
Approved	<i>Dell or Contractor Nominated</i>

2.65 Loudspeaker systems

2.65-IPS-03	HIGH QUALITY, WALL-MOUNTED PAGING LOUDSPEAKER
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Description:

High Quality and high output paging speaker suitable for reproduction of music with extended low frequency response from a 6.5" driver. 1" dome tweeter

Up to 40W power handling from 100V line system. Built in transformer taps for 25W, 12.5W, 6.3W

Cabinet to be tuned and of professional quality with no audible buzzes or vibration from the housing and mountings.

Horizontal coverage of 90 degrees, with a maximum calculated peak SPL of 110dB

Construction:

Constructed from strong semi-expanded polystyrene, screw terminal blocks with guards and safety straps for added safety. Steel grille.

Finish:

Black as supplied

Mounting:

Wall mounted with self-levelling bracket.

Final mounting position and height to be confirmed by theatre consultant

Accessories:

All necessary mounting hardware, wall brackets and fittings.

Variants:

The following variants are required:

2.65-IPS-06/VHX	Installed small loudspeaker 6", with angled wall mount bracket 100v line
Approved:	Yamaha VS6

2.65-LAS-AL MAIN CENTRE CLUSTER LOUDSPEAKER

Description:

Passive 2-way augmented array loudspeaker
Frequency response (-5 dB standard): 60 Hz – 18 kHz
Max. sound pressure: 138 dB with D20/30D, 139 dB with D40/D80 amplifier
Nominal impedance: 8 ohms
Dimensions (H x W x D): 322 x 700 x 356 mm
Weight: 23 kg (51 lb)

Construction:

Plywood with high impact PCP finish.
Rigid metal grills backed by an acoustically transparent and water repellent fabric.

Finish:

As supplied – manufacturer Black

Mounting:

On rigging solution as described elsewhere.

Accessories:

ALi top mounting frame (one required for set of 3 speakers)
Inter-locking pins to attach the speakers to each other.
Suitable black half-couplers and rigging to attach to trussing and to fully support unit.
Link Cables fitted with NL4 connectors to link between boxes and to audiovisual infrastructure.

Variants:

The following variants are required:

2.65-LAS-AL/i190 Installation specific medium format 2-way augmented array
loudspeaker, Components 2 x 10" LF driver, 1 x 1.4" exit
compression driver with 3" coil, Dispersion 90° x 30°

Approved: *d&b audiotechnik ALi90*

2.65-LAS-CL MAIN LEFT / RIGHT LOUDSPEAKERS

Description:

Installation version Compact Cardioid Line Array loudspeaker
Frequency response (-5 dB standard): 60 Hz – 18 kHz
Max. sound pressure: 137 dB with D40/D80 amplifier
Nominal impedance: 10 ohms
Weight - 17.6 kg / 38.8 lb
Splay Angle Setting - 0 to 14 degrees
Dispersion angle varies depending on variant

Construction:

Plywood with high impact PCP finish.
Rigid metal grills backed by an acoustically transparent and water repellent fabric.

Finish:

As supplied – manufacturer Black

Mounting:

To sides of proscenium in technical zone

Accessories:

- CCL Top Mounting Frame x2 (1 per side)
- Inter-locking pins to attach the speakers to each other.
- Suitable black half-couplers and rigging to attach to gallows arm and to fully support unit.
- Link Cables fitted with NL4 connectors to link between boxes and to audiovisual infrastructure.
- Suitably rated 'Gallows Arm' rigging bracket

Variants:

The following variants are required:

- | | |
|-----------------|---|
| 2.65-LAS-CL/i08 | Installation specific compact cardioid line array loudspeaker, Components LF: 2 x 7" + 2 x 5"; HF: 2 x 1.75", Dispersion 80° |
| Approved: | <i>d&b audiotechnik CCLi8P</i> |
| 2.65-LAS-CL/i12 | Installation specific compact cardioid line array loudspeaker, Components LF: 2 x 7" + 2 x 5"; HF: 2 x 1.75", Dispersion 120° |
| Approved: | <i>d&b audiotechnik CCLi12P</i> |

Description:

High quality flyable subwoofer loudspeaker suitable for installations.

Passive Cardioid Subwoofer

1 x 15" driver / 1 x 10" driver

Frequency Response (-5 dB Standard) 39 Hz - 150 Hz

Nominal Impedance 10 ohm

Power Handling (RMS/Peak 10 ms) 500 W / 1200 W

Max. SPL (with D40/D80/D90) 132 dB

Note 6 subs are for permanent installation, 6 are deployable.

Construction:

Plywood with high impact PCP finish.

Rigid metal grills.

Finish:

As supplied – manufacturer Black

Mounting:

On rigging solution as described elsewhere (x6)

Supplied as loose equipment (x6)

Accessories:

CCL Sub mounting frame 6 total (for permanently rigged subs)

Suitable black half-couplers and rigging to attach to trussing and to fully support unit.

Cable fitted with connectors to link to audiovisual infrastructure.

Wheel board and cover 6 total (for deployable speakers)

6 x 20m NL 4 speaker cables for deployable speakers

Variants:

The following variants are required:

2.65-SWF-01/CCL Installation specific small to medium format flyable cardioid subwoofer, Components 1 x 15" + 1 x 10", Dispersion Cardioid

Approved: *d&b audiotechnik CCLi-SUB*

Description:

Passive 2-way point source loudspeaker
Frequency response (-5 dB standard): 59 Hz – 18 kHz
Max. sound pressure: 136 dB with D40/D80 amplifier
Nominal impedance: 8 ohms
Dimensions (H x W x D): 580 mm x 257 mm x 341 mm
Weight: 18 kg / 40 lb

Construction:

Plywood with high impact PCP finish.
Rigid metal grills backed by an acoustically transparent and water repellent fabric.

Finish:

As supplied – manufacturer Black

Mounting:

On rear of lighting bridges

Accessories:

YP Mounting bracket (1 per speaker)
Suitable black half-couplers and safety bonds to fully support unit.
Loudspeaker Cables fitted with NL4 connectors to link between boxes and to audiovisual infrastructure.

Variants:

The following variants are required:

2.65-PSS-Yi/10P	Installation specific high performance 2-way passive point source loudspeaker with wide dispersion, Components 2 x 8"/1.4", Dispersion 110° x 40°
Approved:	<i>d&b audiotechnik Yi10P</i>

2.65-FRC-05 SIDE FILL LOUDSPEAKERS

Description:

Compact high quality full range point source compact loudspeaker.
100degree conical dispersion.
Passive crossover network for LF 5" drivers and 1" HF coaxial driver.
Frequency response of 80Hz to 20kHz
60W RMS power handling.

Construction:

High impact injection moulded plastic with metal grill to front.

Finish:

As supplied – manufacturer Black

Mounting:

Surface mounted according to location. Final mounting position and height to be confirmed by architect and theatre consultant.

Accessories:

All necessary mounting hardware and fittings as required to fully support unit. 2.5mm² loudspeaker cable fitted with connectors to link to audiovisual infrastructure.
Z5422 mounting bracket and safety bond

Variants:

The following variants are required:

2.65-FRC-05/001 Installation specific 2-way compact coaxial loudspeaker,
Components 5"/1", Dispersion 100° conical
Approved: *d&b audiotechnik 5S*

2.65-PSS-10 SIDE FILL LOUDSPEAKERS

Description:

Compact high quality full range point source compact loudspeaker.
100degree conical dispersion.
Passive crossover network for LF 10" drivers and 1.4" HF coaxial driver.
Frequency response of 60Hz to 18kHz
200W RMS power handling.

Construction:

High impact injection moulded plastic with metal grill to front.

Finish:

As supplied – manufacturer Black

Mounting:

Surface mounted according to location. Final mounting position and height to be confirmed by client and theatre consultant.

Accessories:

All necessary mounting hardware and fittings as required to fully support unit. 2.5mm² loudspeaker cable fitted with connectors to link to audiovisual infrastructure.

10S mounting bracket and safety bond

Variants:

The following variants are required:

2.65-PSS-10/10S Installation specific 2-way compact coaxial loudspeaker,
Components 10"/1.4", Dispersion 75° x 50° rotatable
Approved: *d&b audiotechnik 10S*

2.65-MS-02	PASSIVE FULL RANGE MONITOR LOUDSPEAKER
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Description:

High quality full range portable monitor loudspeaker.

Passive crossover network for LF and HF drivers.

15" LF driver, 1.4" HF compression driver

Frequency Response (-5 dB standard) 55 Hz - 20 kHz.

Max. SPL (with D20/30D/D80) 135 dB

Weight 23 kg / 50 lb

Construction:

Plywood with high impact PCP finish and carry handles.

Rigid metal grills backed by an acoustically transparent fabric.

Finish:

As supplied – manufacturer Black

Mounting:

Supplied as loose equipment

Accessories:

1 x 20m NL4 loudspeaker cable per monitor with loose heatshrink

Variants:

The following variants are required:

2.65-MS-02/MAX 2-way stage monitor, Components 15"/1.4", Dispersion 75°
Approved: *d&b audiotechnik MAX2*

Description:

Full range high quality loudspeaker suitable for music playback, occasional speeches and paging.
Unit is to be supplied with integrated transformer for 100V line systems with multiple taps.
Frequency range +/- 10dB to be 60hz-18khz with extra wide dispersal.
20W RMS power handling.
SPL @ 1m 109dB
8" woofer with 1" coaxial tweeter
Internal passive crossover network when utilising coaxial tweeter.
Coverage angle not less than 80 degrees

Construction:

As supplied – must be IP rated suitable for use in shower rooms.

Finish:

White as supplied

Mounting:

Mount in suspended ceilings. Final mounting position and height to be confirmed by client and/or theatre consultant.

Accessories:

All mounting brackets, accessories and cabling to connect to AV infrastructure.
Provided with rear fire cap if required.

Variants:

The following variants are required:

2.65-IPS-04/001	Ceiling mounted paging loudspeaker for background calls/show relay - 100v line IP Rated for use in shower rooms
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Description:

Full range high quality loudspeaker suitable for paging.

Rated impedance (low impedance) 8 Ω

Frequency response -250 Hz - 10 kHz

Sensitivity (1 W, 1 m) 113 dB

Construction:

As supplied

Finish:

Black in backstage areas, otherwise White as supplied

Mounting:

To walls as indicated on GA drawings. Final mounting position and height to be confirmed by client and/or theatre consultant.

Accessories:

All mounting brackets, accessories and cabling to connect to AV infrastructure.

Variants:

The following variants are required:

2.65-IPS-65/001 Wall mounted 100v paging horn loudspeaker for paging in stage / fly gantries

Approved: TOA SC-630

Description:

Simple installed loudspeaker suitable for use as paging & background music speaker, frequency response approximately 180Hz to 18kHz.

Multiple taps for 100V line system.

Construction:

Steel front chassis and grille all epoxy powder-coated in colours as specified by Architects to match surroundings.

Die cast back box when surface mounted.

Finish:

Single RAL colour to architect's approval from standard colour range.

Mounting:

Wall or ceiling surface mounted according to location. Final mounting position and height to be confirmed by architect and theatre consultant

Accessories:

All necessary mounting hardware and fittings.

Variants:

The following variants are required:

2.65-IPS-04/STB	Ceiling/Wall surface mounted low profile high output paging loudspeaker for paging calls (approx. 180Hz-18kHz response), surface mount
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Approved:	<i>Penton Sentry 6</i>
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Description:

High quality full range point source loudspeaker suitable for installations.

Passive crossover network for LF and HF drivers.

Components 2 x 4.5", 2 x 1.25", Dispersion 90° x 30° rotatable

Construction:

Plywood with high impact PCP finish.

Rigid metal grills backed by an acoustically transparent and water repellent fabric.

Finish:

Single RAL colour to architect's approval from standard colour range.

Mounting:

Into front edge of stage as indicated on GA drawings. Final mounting position and height to be confirmed by client and theatre consultant.

Accessories:

All necessary mounting hardware and fittings as required to fully support unit.

Cable fitted with connectors to link to audiovisual infrastructure.

Z5427.000 backbox with grille

Variants:

The following variants are required:

2.65-PFS-IP/204	2-way ultra-compact flush mountable loudspeaker, Components 2 x 4.5", 2 x 1.25", Dispersion 90° x 30° rotatable. Inc backbox and front grille
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Approved:	D&B 44S with backbox Z5427.000
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2.66 Microphones, inputs and playback equipment

2.66-IMC-02	INSTALLED MICROPHONE
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Description:
Professional quality hyper-cardioid microphone to interface with audio processor and paging system as described elsewhere.

Construction:
Robust housing, un-switched.

Finish:
As supplied.

Mounting:
Mount in anti-shock mount on lighting bridges

Accessories:
Anti-shock mounting bracket with all necessary fixings to mount microphone.
Final location and fixing detail to be co-ordinated with client and theatre consultant.
Suitable interconnection lead from microphone to socket outlet box.
Phantom power adapter as required.

Variants:
The following variants are required:
2.66-IMC-02/001 High-quality hyper-cardioid microphone c/w anti-shock mounting bracket
Approved: *Audio-Technical AT8015*

2.67 Video and cinema equipment

2.67-CAM-01	NIGHT VISION CAMERA
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Description:

- High-quality video camera with monochrome infrared 75ohm composite video output, manual zoom lens. Minimum resolution 520 TV lines, PAL.
- Camera to be powered via local power supply mounted adjacent to camera.
- Camera to be fitted with infrared emitters around lens.
- Camera to be set to infra-red at all times, and not switchable between 'daytime' and 'night time', camera to be live at all times with no PIR movement sensors or other triggering of gated signal.

Construction:

- Sturdy ABS plastic housing.

Finish:

- As supplied

Mounting:

- Supplied loose, with clamp to fit to 48.3mm OD lighting bar

Accessories:

- Suitable power supply.
- Suitable mounting bracket with swivel head and robust fixing base.
- Short connection cable(s) to infrastructure

Variants:

- The following variants are required:
 - 2.67-CAM-01/IR1 High quality fixed night vision video camera with integral Infra-red source with manual zoom/focus and adjustable mount

Description:

Remote control High-Definition Colour camera for professional image capture.
NDI for video signal and control.
Image sensor to be equal or greater than 1/2.8" 2.13MP CMOS
Web based or software-based control interface via IP for all remote functions, to include but not limited to: Pan/Tilt/Zoom (optical and digital)/Focus. Or use with remote controller.
Auto and manual control for white balance, gain, exposure, focus.
Up to 2160p @60fps resolution
Optical zoom of x20
8.46 MPixels

Construction:

Tough moulded ABS plastic case or similar
1no. RJ45 port for VoIP
RS 422 and/or RS 232 control port
Additional HDMI output, 12G SDI output

Finish:

As manufactured, colour Black.

Mounting:

Camera fixed to balcony front – co-ordinate with Client on exact position

Accessories:

Cables to connect to local facility panels
Bracket to connect to 48.3mm pipe

Variants:

The following variants are required:

2.67-CAM-01/CL2	High-resolution PTZ 12G SDI & NDI camera with zoom lens and adjustable mount
Approved:	<i>Birddog X5 Ultra</i>

Description:

Image Sensor: 1/2.8-inch CMOS

Optical Zoom: 12x

Resolution: 4K (2160p) at up to 60fps

Video Formats: 2160p @ 60/59.94/50/30/29.97/25fps, 1080p @ 60/59.94/50/30/29.97/25fps, 720p @ 60/50/30/25fps

Angle of View: Horizontal: 72.8° ~ 6.8°

Networking: NDI® | HX3, NDI® | HX2

Connectivity: USB-C (UVC1.1), RS485 (2pin phoenix port), HDMI, 3G-SDI, 3.5mm audio I/O

Construction:

Tough moulded ABS plastic case or similar

1no. RJ45 port for VoIP

RS 422 and/or RS 232 control port

Additional HDMI output, 3G SDI output

Finish:

As manufactured, colour Black.

Mounting:

Supplied as loose equipment

Accessories:

Cables to connect to local facility panels

Power supply

Mounting adaptor to connect to microphone stand

Variants:

The following variants are required:

2.67-CAM-03/001 High quality fixed colour camera with 12x optical zoom, SDI and NDI connectivity, Power supply and mic thread adaptor

Approved: *Birddog Maki Ultra 12X*

2.67-EMB-05 SDI AUDIO EMBEDDER

Description:

Audio embedder for SDI video feed. Up to 4 channels of audio embedded onto single SDI feed

Construction:

Small form factor. As supplied

Mounting:

Mounted within equipment racks, cabling connected to infrastructure patchbays.

Accessories:

All interconnection cables to patchbays (SDI and Audio)

Power supply/power pack/power cables

Rackmounting hardware

Variants:

The following variants are required:

2.67-EMB-05/SDA Unit to embed show relay audio onto show relay video feed.

Approved: *Blackmagic Mini Converter Audio to SDI inc. rackmount*

2.67-IPT-02 VIDEO DECODER - ETHERNET TO HDMI

Description:

PoE video receiver to decode incoming NDI signal from networked video camera or encoder and convert to a HDMI signal. Embedded user interface allowing remote selection of NDI source. The SSC Should allow sufficient time for programming of the Video – NDI system to ensure that audio and video signals are time aligned and that the end point video decoders function correctly. The end point should be controllable by the monitor remote control via CEC.

Construction:

HDMI and network ports

Tough moulded ABS plastic case or similar

Mounting:

Supplied as loose equipment

Accessories:

PSU, USB power cable, network and HDMI cables, remote control

Variants:

The following variants are required:

2.67-IPT-02/VDC Unit to convert IP show relay feed into HDMI for use with standard TV monitors

Approved: *Birddog Play*

Description:

NDI encoder for transmitting 4 x SDI signals to NDI video over IP.
Support for UHD 4K video over Gigabit Ethernet audiovisual network with HDMI ports.
Web based set up with programming of unique addresses. Devices fully routable live from the audiovisual control system processor and touch screen interfaces.
PoE+.
4 x 12G SDI inputs
4 Line OLED screen
USB 3
SFP+

Construction:

Small form factor. Aircraft Grade aluminium case

Mounting:

Mounted within equipment racks, cabling connected to infrastructure patchbays.

Accessories:

All interconnection cables to control equipment, monitors and patch points (HDMI, network and audio cables)
Power supply/power pack/power cables
Rackmounting hardware
Configuration software and programming.

Variants:

The following variants are required:

2.67-IPT-01/BWP	Unit to convert 4 x 12G SDI video to a suitable format for distribution through CAT6e cables through the venue
Approved:	<i>Birddog 4K SDI QUAD</i>

Description:

A keyboard, video, mouse extender device which allows control of the rack based PC from another location within the venue.

A transmitter and receiver device

A 24" HD monitor, keyboard and mouse supplied as loose equipment

Construction:

As supplied.

Finish:

As supplied.

Mounting:

Rack end of KVM installed equipment rack. Receiver end mounted to back of monitor. Other items supplied as loose equipment.

Accessories:

Cabling from KVM receiver and transmitter to PC and to loose monitor, keyboard and mouse.

Variants:

The following variants are required:

2.67-KVM-01/001	Keyboard Video, Mouse transmitter and receiver. 24" screen, keyboard and mouse included
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Description:

A 1U rack mountable video router, with built in video display supporting Ultra HD formats up to 12G SDI. Front panel button control and/or external control via network, with seamless switching between inputs and content preview on built-in display. 10 or 20 no. SDI inputs and outputs (dependant on variant) mounted on rear with a further RS-422 and USB ports for control and firmware upgrades.

Construction:

Durable steel compact half rack-mounting size with all connectors on female BNC.

Mounting:

Mount in equipment rack as shown on assembly drawings.

Accessories:

Provide accessories for rack-mounting assembly. Power supply. Cabling to SDI patchbay, network cabling to network patchbay.

Variants:

The following variants are required:

2.67-LVS-0V/BVH	SDI video distribution amplifier with integrated matrix 20 x 20 with screen
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Approved: *Blackmagic Videohub 20x20 12G*

Description:

Dual 7" display to allow viewing of multiple video signals up to 4K. SDI signals
HDMI and 12G SDI inputs
On/Off button with front panel controls

Construction:

Rack mountable metal casing.

Finish:

As manufactured

Mounting:

Rack mounted with all rear panel connections landed on patchbays described elsewhere.

Accessories:

Power cabling and cabling to connect to patchbays

Variants:

The following variants are required:

2.67-MON-02/6U2	Dual 7" rack mount 12G SDI / HDMI monitor
Approved:	<i>Lilliput RM7026-12G</i>

Description:

LCD UHD screen with HDMI input. Support for up to 4K resolution.

Suitable for use in racks

Internal speakers

Construction:

1no. HDMI input.

Tough moulded ABS plastic case or similar

Power button accessed from front.

Finish:

As manufactured

Mounting:

To Penn Elcom LCD04 mount

Accessories:

Power and HDMI and audio cables to connect to PC

VESA mounting plate Penn Elcom LCD04 mount

Variants:

The following variants are required:

2.67-LCD-FP/019 Rackmount Touchscreen 22"

Approved: *Hannspree HT225HPB with Penn Elcom LCD04 mount*

2.68 Communication equipment

2.68-ACR-01	AURACAST RECEIVER
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Description:

Portable receiver for Auracast system with high-quality, low-latency audio.

Front panel OLED display screen for channel name, battery status and charging indicators.

Side mounted volume and power controls.

2no. 3.5mm output jacks for earbuds, headphones, or neck loops.

Quick charging and extended run time battery.

Compatible with all other assisted listening and translation system components.

Construction:

As supplied.

Finish:

As supplied.

Mounting:

Supplied as loose equipment.

Accessories:

Robust earphones suitable for public use.

Neck loops for users of standard telecoil hearing aids

Variants:

The following variants are required:

2.68-ACR-01/001	Auracast receiver with volume controls, 3.5mm headphone socket, source select, compatible with above transmitter and integrated neckloops
Approved:	<i>Ampetronic AURI RX1</i>

Description:

2 Streams of audio capability

Transmitter for Auracast system with high-quality, low-latency audio.

Multicolour status indicator

Side mounted balanced analogue mic/line inputs supporting mono, dual mono and stereo.

Dual Ethernet connection for PoE, network/PC control and Audio over IP.

Dante option included where denoted in variant.

Balanced line output.

USB-C as optional power supply separate to PoE.

Capable of star, repeater or daisy-chain configurations.

Compatible with all other assisted listening and translation system components.

Construction:

As supplied.

Finish:

As supplied.

Mounting:

SSC to co-ordinate with LVC on positioning

Accessories:

All necessary mounting hardware.

All necessary cabling and power supplies.

Variants:

The following variants are required:

2.68-ACT-01/D02 Dual channel Auracast broadcast transmitter, 100m range in open space, networked system management, Dante input, c/w rigging hardware and cables

Approved: *Ampetronic AURI TX2N with DANTE*

Description:

Charging dock for Auracast system receivers.

Quantity of receiver slots as described in variant.

Network capability to store receiver configurations, enabling centralised management, programming and configuration of docking stations and receivers.

Tension lock on each charging slot to ensure charging connectivity.

Quick charging.

Compatible with all other assisted listening and translation system components.

Construction:

As supplied.

Finish:

As supplied.

Mounting:

Supplied as loose equipment.

Accessories:

All necessary mounting hardware.

All necessary cabling and power supplies.

Variants:

The following variants are required:

2.68-ARC-01/004 *Battery charger for 4no. receivers, compatible with above Auracast receiver*

Approved: *Ampetronic AURI D4 charger*

2.68-ARC-02 HEADPHONES FOR RECEIVER

Description:

Dual ear, over-the-head style earphones

Ear cushions are replaceable and are sold separately.

Ear pieces can be covered with disposable sanitary covers which are also sold separately.

Frequency Response 20 Hz - 20 kHz

Impedance 32 ohm +/- 15% @ 1 kHz

Headset Input Sensitivity 110 dB +/- 4dB @ 1 kHz, 1 mW

Rated Power Input 50 mW

Max Power Input 100 mW

3.5mm stereo jack plug

Finish:

As supplied.

Mounting:

Supplied as loose equipment.

Variants:

The following variants are required:

2.68-ARC-02/001 Dual ear headphones to connect to receiver, leatherette earpads

Approved: *Listen Technologies LA-165*

2.68-NKL-02 NECKLOOP

Description:

Advanced Neck Loop provides a reliable and effective way for listeners with telecoil-equipped hearing aids and cochlear implants to utilize the Auracast assistive listening system when connected to an Auracast receiver.

Response 20 Hz - 15 kHz (+/- 3dB ref 1 kHz)

Impedance 3 - 6 ohms @ 1 kHz

Input Sensitivity / Magnetic Field Strength 380 mVrms @ 1 kHz produces 400 mA/m

Max Power Input 1 W

3.5mm stereo jack plug

Finish:

As supplied.

Mounting:

Supplied as loose equipment.

Variants:

The following variants are required:

2.68-NKL-01/001 Intelligent ear phone / neck loop lanyard providing audio to telecoil-equipped hearing aids or cochlear implants, compatible with Auracast receiver

Approved: *Listen Technologies LA-438*

Description:

Digital interpreter interface for providing simultaneous translation.
Three switched outputs with single press 'flip flop' switching.
Three inputs with 'flip flop' switching.
Female XLR input for microphone.
6.3mm jack for headphones.
Automatic ducking system.
Headphone EQ.
Headphone volume pot range +10db to off.
PoE, external DC & AC mains power supply.
Double redundant network connections on copper and SFP fibre.
Mic input gain range -30dB to +15dB.
Equivalent input noise 127dBu (22-22kHz RMS terminated 300 Ohms).
Headphone noise -76.6dB at lineup (residual noise).
Headphone impedance 16 to 1000 ohms with auto output level to match impedance.
Network: Dante / AES67.
Sample frequency 48kHz, 24 bit.
Compatible with all other assisted listening and translation system components.

Construction:

Aluminium, anodized and laser etched, with powder coated sides.

Finish:

As supplied.

Mounting:

Mounted in simultaneous translation booths and connected to audiovisual infrastructure.

Accessories:

All necessary cabling and power supplies.
Storage case.

Variants:

The following variants are required:

2.68-ADC-01/GCH	Custom manufactured audio description console, DANTE, with connection loom and case for console, headset and cable
Approved:	<i>Glen sound Charles Interpreters Box</i>

Description:

Interpreters' headset for providing simultaneous translation.

Dual or single sided headset as described in variant.

Rotatable boom arm integrated directional dynamic microphone.

Microphone frequency response 40Hz to 20kHz.

Headphone frequency response 20Hz to 20kHz.

Straight 3m cable with male 3-pin XLR microphone connector and 6.3mm jack headphone connector.

Compatible with all other assisted listening and translation system components.

Construction:

As supplied.

Finish:

As supplied.

Mounting:

Connected to interpreters' consoles in simultaneous translation booths.

Accessories:

All necessary cabling and converters.

Storage case.

Variants:

The following variants are required:

2.68-IHS-01/002 Dual-muff stereo headset with integral mic, 1no XLR3-M connector and 1no. 6.3mm jack connector

Approved: *Audio-Technica BPHS2*

Description:

Cuelight outstation

Standby and Go lights with acknowledge button built into both lights

Compatible with Stage Management desk master station

Construction:

Aluminium and mild steel

Finish:

Black powder coated

Mounting:

Supplied as Loose Equipment

Accessories:

10m flexible cable with Green ident rings per outstation – confirm this with client

Variants:

The following variants are required:

2.68-CUE-01/002 Cuelight station fitted with red standby and green go light
and confirmation button - RJ45 connection

Approved: GDS Concept Q

Description:

Custom made interface which plugs into the fly floor cuelight outstation

Installed Red and green LED ropelight to run the length of the fly floor which mimic the actions of the smaller cuelights

Dimmer controls to adjust the brightness of the red and green ropelight

4x separate impact resistant acknowledgement buttons spread along fly floor

Construction:

Aluminium and mild steel

Finish:

Black powder coated

Mounting:

Custom – Client input required to locate positions of ropelight and the acknowledgement buttons and also the dimmer switches.

Variants:

The following variants are required:

2.68-CUE-02/CUS	Custom interface and set of green and red ropelight with level adjustment
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Description:

Custom-manufactured wheeled free-standing stage manager's desk with motorised, adjustable height legs to allow for operation either standing or sitting.

Items within the desk to be mounted on standard 19" rack panels unless described otherwise.

To include the following facilities:

- a) Paging microphone with four zone functionality. 'Backstage' and 'Front of House' non-latching illuminated LED 'press to talk' buttons. Microphone to be gooseneck type with plug-in point to remove when desk is stored and transported. Selection switch to allow paging from headset of technical intercom. Client input required on functionality of zone buttons.
- b) 1U Show relay speaker with volume control and latching show relay speaker on/off illuminated LED button.
- c) 19" 1U rack mount technical intercom main/master station with on/off buttons, volume control and call buttons for each channel, to be same make as loose comms equipment. Connection point for headset and integrated loudspeaker.
- d) 2no. LED gooseneck task lights with local dimmer control.
- e) 2no. USB charging points
- f) 1no. digital stopwatch with simple start/pause/reset controls, 1no digital clock.
- g) 19" Cuelights master control panel, control panel to comprise one row of red illuminated STANDBY switches with STANDBY MASTER switch, and one row of blank labels, one row of blue PRESET switches with PRESET MASTER switch and green illuminated GO switches with GO MASTER switch. Each switch indicator lamp is to accurately reflect the status of the cuelight outstation lamp which it controls. Standby lights to flash until acknowledged.
- h) 2no. colour monitor 19" rackmount , 8" screens with individual brightness/contrast control
- i) Present all facilities as individual connectors with coloured indication of function to match up with stage management desk connection points, as part of a braided 8m loom. Mains on/off switch.
- j) Desk to have wheels to enable it to be moved to different locations. Wheels must be lockable and the desk must be sturdy when locked into place for use.
- m) Control of houselights via 5 button paradigm panel

Desk to incorporate hinged angled script desk with space beneath for storage of prompt copy, pencils, etc.

Allow for production of detailed construction drawings and adequate design development time and LVC client input before manufacture.

Construction:

Desk to be custom-manufactured

Appropriate handles to be built into the construction.

Base to comprise steel frame with lockable wheels, adjustable height legs, housing angled footrest.

Desk body to be self-contained and removable from steel base.

Construction to be high quality and extremely reliable and sturdy.

Finish:

All finishes to be to extremely high-quality black finish.

Mounting:

Supplied as loose equipment.

Accessories:

Suitable 8metre interconnection cable loom with all connections presented on individual colour-coded connectors, braided overall sleeve. Powercon True1 TOP type lockable power cable to provide power to the desk.

Variants:

The following variants are required:

2.68-SMD-01/001 *SM Desk on wheels, Cuelight master station, 1U Comms, 2 x 7"monitors, Audio monitor, Clock and Stopwatch, Paging station and mic, 5 button houselight control*

2.68-TIB-02 WIRED INTERCOM BELT PACK

Description:

Portable belt pack for ethernet based digital technical intercom system.
Capable of up to four channels
POE
Configurable via software interface
Suitable for use with technical intercom within SM console described elsewhere.
Network connection with Ethercon locking ethernet connector, headset connection via 4-pin XLR.

Construction:

High-impact plastic case with integral belt clip.

Finish:

As supplied.

Accessories:

10 metre flexible and deployable CAT6A Cable with Neutrik ethercon connectors to connect beltpacks to infrastructure

Mounting:

Supplied as loose equipment.

Variants:

The following variants are required:

2.68-TIB-02/001 Wired digital intercom belt pack and cable
Approved: *Green-GO - GO-BPX*

Description:

Portable belt pack for ethernet based digital technical intercom system.
Capable of up to 32 channels
POE
Configurable via software interface
Suitable for use with technical intercom within SM console described elsewhere.
Network connection with Ethercon locking ethernet connector, headset connection via 4-pin XLR.
19" rackmount Battery charger for 6 batteries
Spare Batteries
DECT Active Antenna with up to 5 wireless beltpacks per antenna.

Construction:

High-impact plastic case with integral belt clip.

Finish:

As supplied.

Accessories:

10 metre flexible and deployable CAT6A Cable with Neutrik ethercon connectors to connect beltpacks to infrastructure
Clamp to attach antenna to 48.3mm pipe and 10m cable to connect to infrastructure (Co-ordinate positions of antenna with client)

Mounting:

Supplied as loose equipment.
Battery chargers installed to client location

Variants:

The following variants are required:

2.68-TIB-02/001	Digital beltpacks for wireless intercom
Approved:	Green-GO - GO-WBPX
2.68-TIB-02/002	Battery charger for 6no. wireless intercom belt pack batteries
Approved:	Green-GO - GGO-BC6
2.68-TIB-02/005	Wireless intercom Spare battery pack
Approved:	Green-GO - GO-GGO-NRGP
2.68-TIB-02/004	Remote antenna kit for wireless intercom system
Approved:	Green-GO - GO-STRIDE

Description:

Headset with integral mic for technical intercom belt pack.
Fitted with integral cable and suitable connector for use with technical intercom belt pack described above.
Single earpiece with foam muff surround.
Adjustable mic on flexible plastic arm.
Entirely compatible with belt packs described elsewhere.
200ohms microphone impedance
400ohm Earpiece impedance

Construction:

High-impact plastic.

Finish:

As supplied.

Mounting:

Supplied as loose equipment.

Accessories:

Suitable connector to interface with belt packs described elsewhere

Variants:

The following variants are required:

2.68-TIH-01/001 Lightweight headset with integral mic.
Approved: GREEN-GO HS200S

Description:

Wall mount intercom station
Integral loudspeaker
POE powered
Touch screen display
Encoder
XLR4 pin headset connection
3 multi-coloured backlit buttons
Entirely compatible with belt packs described elsewhere.

Construction:

As supplied

Finish:

As supplied.

Mounting:

Supplied as loose equipment.

Accessories:

Suitable flexible cable to connect to facility panels described elsewhere

Variants:

The following variants are required:

2.68-TWS-01/001 Wired POE Wall panel station for intercom
Approved: GREEN-GO GGO-WPX

2.69 Audio miscellaneous

2.69-MIC	EXISTING FOH DIGIPAGE SYSTEM TESTING
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Description:

Testing of existing Digipage paging system.

The proposed new control system (Qsys) for the paging system will replace the existing Digipage control system, but the existing amplifiers, loudspeakers and volume controls for the existing Digipage system will remain in use.

This item line is to ensure that the SSC fully tests the functionality of the existing Digipage system before work commences on replacing the control side.

The SSC should raise any concerns regarding existing amplifiers and loudspeakers to the client and the theatre consultant before this work commences.

Variants:

The following variants are required:

2.66-IMC-02/001	Assessment and Testing of existing Digipage Front of House amplifiers and loudspeakers for paging system
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2.69-PAS-01	EXISTING FOH SYSTEM TESTING
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Description:

Testing of existing (1982) front of house paging system. (Not Digipage)

The proposed new control system (Qsys) for the paging system will replace the existing Digipage control system, and the original backstage and front of house Carr and Angier specified system.

The client has advised us that the existing front of house amplifiers and loudspeakers – marked as Theatre Zone 2 on the general arrangement drawings were originally part of a PAVA system which to their knowledge has not been serviced or maintained as such, however, is still in use for announcements.

This item line is to ensure that the SSC fully tests the functionality of the existing PAVA amplifiers and loudspeakers covering Zone 2 to assess their suitability for continued use. Once an assessment has been made then the SSC should liaise directly with the client for any proposed changes to this system to ensure it can be used for making announcements to the front of house areas.

This may require input from a fire consultant, so the SSC should price for this into their tender return.

The SSC should advise the client and theatre consultant of any additional equipment or work required not included in this tender for this system to become functional again. The SSC should also advise the client and theatre consultant on what they are able to provide a warranty for when it comes to existing equipment and wiring.

Variants:

The following variants are required:

2.66-PAS-01/TPS	Assessment and Testing of existing Theatre Front of House PAVA amplifiers and loudspeakers for paging system
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2.69-PAS-02 BACKSTAGE PAGING SYSTEM REMOVAL

Description:

The proposed new control system (Qsys) for the paging system will replace the existing Digipage control system, and the original backstage and front of house Carr and Angier specified system.

This tender includes the replacement of all loudspeakers, amplifiers and volume controls in the backstage areas of the theatre, control rooms, followspot room, stage and galleries.

This line item is to ensure that the existing show relay speakers, cabling, containment, amplifiers and rack equipment that currently serve this function are removed.

The SSC should co-ordinate with the client LVC on the phasing of this work, to ensure that a functioning paging system is maintained as much as possible during the work.

Variants:

The following variants are required:

2.66-PAS-02/REM	Removal of existing paging speakers within the backstage areas coloured yellow on CBL paging GA drawings
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2.69-PAS-03 INTERCONNECTION OF NEW AND EXISTING PAGING SYSTEMS

Description:

The proposed new control system (Qsys) for the paging system will replace the existing Digipage control system, and the original backstage and front of house Carr and Angier specified system.

This tender includes the replacement of all loudspeakers, amplifiers and volume controls in the backstage areas of the theatre, control rooms, followspot room, stage and galleries and that the front of house areas and arena areas are covered by existing equipment (see items 2.69-MIC-CA/920, 2.69-PAS-01/TPS, 2.69-PAS-02/REM for details)

This line item is to ensure that the SSC successfully connects the new amplifiers and speakers shown on the CBL Paging GA drawings to the new Qsys based paging control system, and that the existing amplifiers and loudspeakers are also able to be controlled by this new system.

The SSC should co-ordinate with the client LVC on the phasing of this work, to ensure that a functioning paging system is maintained as much as possible during the work.

The SSC should advise the client and theatre consultant of any additional equipment or work required not included in this tender for this system to become functional again. The SSC should also advise the client and theatre consultant on what they are able to provide a warranty for when it comes to existing equipment and wiring.

Variants:

The following variants are required:

2.66-PAS-03/INT	Wiring and integration of existing amplifiers and loudspeakers system to be controlled by new Qsys control system.
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Description:

Suitably rated black trussing to be rigged using manual chain hoists, then dead-hung from existing I beams in the forestage grid.

Trussing to be sized after a site visit and consultation with the client.

Trussing to hold 6 x subwoofer loudspeakers and centre cluster

Trussing will be lowered once or twice a year for maintenance only, hence no need for motors.

Mounting:

On rigging beams in forestage grid.

Finish:

Powder coated matt black

Accessories:

All rigging accessories, beam clamps, shackles, spansets as required to make a fully functional system.

Variants:

The following variants are required:

2.69-HOI-01/RIG	Manual chain hoists, dead hang rigging and truss to hang subwoofers and centre cluster
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3 EXECUTION

It is important to note that the scoping of the works indicated below is for guidance only and remains the responsibility of the Client and Main Contractor. The specifier takes no responsibility for the packaging of the works, nor for the sequencing or co-ordination required between contractors of the Specialist Contractor and Client for the delivery of the works.

It is worth re-stating here that it will be expected that the tenderer will allow for significant co-ordination time in their return, concurrent with their experience of similar installations, their knowledge of the inherent complexity of theatrical buildings, and their extensive theatrical and electrical installation works.

The section numbers below equate directly to the section numbers in the Equipment schedule and the system descriptions in section 1.

3.1 Stagelighting systems

SL 1.1 INFRASTRUCTURE

Scope:	Design, supply & installation of main distribution boards and power supplies. Design, supply and installation of containment & wiring. Design, supply and installation of backboxes, faceplates and dimmer/relay racks. Test and commission system
Notes:	Include builderswork in conjunction with containment system, as well as acoustic penetration measures.

Design

- Submit for approval detailed layout drawing of the existing dimmer room showing location of all equipment and any critical containment routing or free space required around equipment.
- Submit for approval a detailed stagelighting power wiring cable schedule and schematic showing allocation and destinations of all load wiring from relay racks and stagelighting power distribution boards.
- Submit for approval layout drawings showing location and position of all facility panels.
- Provide construction drawings of all back boxes, faceplates, socket raceways and custom power panel for approval prior to manufacture.
- Engage in discussions with the client to ensure significant planning is completed so current facilities are fully maintained or equivalent facilities are provided, to ensure no interruption of service while works are undertaken.

Coordination

- Provide guidance as necessary on containment and check sizing is adequate prior to installation of containment.
- Check that the power supplies provided for the racks and equipment in the existing dimmer room are adequately sized.
- Attend all electrical coordination meetings relevant to this package.
- Co-ordinate finish and location of all facility panels with Theatre Consultant & Client.
- Provide guidance as necessary to Client on detailed installation of facility panels, provision of cover panels and mounting recesses for facility panels where required.
- Ensure labelling of stagelighting power outlets includes correct circuit references.

Installation

- In full consultation with the client, remove any existing containment, electrical wiring, dimmer racks, stagelighting facilities panels and back boxes, not required as part of the works, that are relevant to the works being undertaken. Once removed, items should be taken away and disposed of/recycled in co-ordination with environmental regulations.
- Supply relay racks and undertake first fix in accordance with building programme.
- Supply anti-vibration mountings for relay racks as required. Provide guidance to specialist contractor on-site staff for installation of relay racks and connection of containment to racks. Ensure anti-vibration mountings are correctly installed.
- Supply SLB backboxes and raceways and first fix in accordance with building programme.
- Supply custom power panel and first fix in accordance with building programme.
- Provide manufacturer's termination instructions relay racks, along with final cable schedule. Provide guidance to on-site electricians to demonstrate wiring and termination methods.
- Supply outlet box faceplates for second fix.
- Provide guidance to specialist contractor's on-site electricians to demonstrate wiring and termination methods, including dressing of cables within facility panels to allow faceplates to hinge open.
- Undertake all First and Second Fix tasks as per the contract, as required.

Commissioning & witness testing

- Undertake and complete full electrical tests as the electrical contractor and issue test certificates for the relay racks and load wiring, supply and install modules into relay racks. Turn on and commission the relay racks and prove operation from stagelighting control system.
- Provide, for the purposes of commissioning, any equipment that is required to fully commission and demonstrate the stagelighting infrastructure.
- Provide staff and access equipment to assist the Theatre Consultant with witness testing of the relay racks and all socket outlets on the facility panels.
- The specialist contractor should also advise the client and theatre consultant on what they are able to provide a warranty for when it comes to existing equipment and wiring.

SL 1.2 STAGELIGHTING CONTROL SYSTEM

Scope:	Design, Supply and Install stagelighting control equipment rack, DMX and Ethernet distribution equipment. Test and commission system
Notes:	Supply & installation of containment & wiring is part of this scope.

Design & coordination

- Submit for approval a detailed stagelighting control wiring cable schedule and schematic showing allocation and destinations of all control wiring from existing dimmer room equipment.
- Submit for approval construction drawings of stagelighting control equipment rack and detailed patchbay layout and labelling drawings prior to fabrication.
- Coordinate with containment design and ensure that no network cable runs exceed 90m. Where network wiring runs exceed 90m in length, additional network extension equipment must be installed to reduce the cable length below 90m. Where this is found to be necessary, proposals for the installation of additional equipment are to be submitted for approval prior to installation.

Installation

- In full consultation with the client, remove any existing containment, data wiring and data racks, not required as part of the works, that are relevant to the works being undertaken. Once removed, items should be taken away and disposed of/recycled in co-ordination with environmental regulations.
- Supply stagelighting control equipment rack for first fix in accordance with building programme.
- Provide final cable schedule showing details of all wiring terminations, including power supplies to rack from local isolators or MCBs.
- Provide guidance to on-site electricians to demonstrate wiring and termination methods.
- Supply and install the DMX and Ethernet patchbays and labels. Install all internal data links within the rack leaving only the termination of site wiring from the relay racks and data outlet boxes for the electrical subcontractor. All terminations to be standard connector, crimp or punch down.
- Supply and install UPS unit in rack.
- Supply and install data distribution equipment in equipment rack.
- Supply and configure all nodes as loose equipment.
- Supply and install patch cords in patchbays as appropriate. Uninstalled patch cords to be handed to the Client as loose equipment.
- Undertake all First and Second Fix tasks as per the contract, as required.

Commissioning & witness testing

- Provide for the purposes of commissioning any equipment that is required to fully commission and demonstrate the stagelighting control systems.
- Provide staff and access equipment to assist the Theatre Consultant with witness testing of the DMX and Ethernet wiring infrastructure and all socket outlets on the facility panels.
- Demonstrate fully-functioning DMX and/or Ethernet control systems to the Theatre Consultant.
- Carry out all training as detailed within Section 1 of this specification.
- The specialist contractor should also advise the client and theatre consultant on what they are able to provide a warranty for when it comes to existing equipment and wiring.

SL 1.3 HOUSELIGHT & WORKLIGHT CONTROL SYSTEM

Scope: Supply worklights processor, master panels and local control panels. Supply worklights control cabling 'free-issue' to EC for installation by EC. Terminate all control cabling. Configure and commission system.

Notes: Supply & installation of containment, installation of backboxes and installation of control wiring is part of this scope.

Design & coordination

- Submit for approval detailed worklight relay schedule, schematic and cable schedule showing allocation and destinations of all load wiring.
- Co-ordinate finish and location of all worklight local control points and master panels with Theatre Consultant and client and submit for approval detailed control panel drawings prior to fabrication.
- Provide guidance as necessary to client on detailed installation of control panels, provision of cover panels and mounting recesses for control panels where required.
- Provide for approval detailed proposal for programming of houselight / worklight control system and layout of touchscreen panels, and co-ordinate with Theatre Consultant and Client.
- Coordinate text labelling of all control panel buttons with Theatre Consultant and Client team and include on submitted drawings for approval prior to manufacture.
- Attend initial meeting with the Client and Theatre Consultant to agree the system criteria. Develop draft system configuration. Conduct a demonstration with the Client and Theatre Consultant of a working development version of the configuration, at least 4 weeks prior to installation on site.

Installation

- Map all existing White Worklight circuits, indicate each cable, disconnect from existing white worklight racks for reconnection to new relay racks.
- In full consultation with the client, remove any existing containment, data wiring, worklight relay racks and worklight control panels not required as part of the works, that are relevant to the works being undertaken. Once removed, items should be taken away and disposed of/recycled in co-ordination with environmental regulations.
- Supply worklight racks for first fix in accordance with building programme, along with manufacturer's termination information and final cable schedule. Provide guidance to on-site electricians to demonstrate wiring and termination methods.
- Supply backboxes for worklight local control panels and master panels for first fix in accordance with building programme.
- Supply and install control wiring for all master and local panels.
- Provide final control cable schedule.
- Supply, install and terminate worklight local control panels and master panel faceplates in accordance with building programme.
- Re-site existing paradigm houselight processor to new stagelighting data rack and restore all existing connections in new location. Supply and install power supplies, DMX splitters and Blues power supplies in control equipment racks. Provide programming in accordance with agreed control proposal and specification.
- Re-connect all White Worklight circuits to new relay racks, disconnected from old worklight relay racks.
- Terminate all remaining worklight control wiring in accordance with building programme.
- Undertake all First and Second Fix tasks as per the contract, as required.
- Supply portable worklights control panel as loose equipment.

Commissioning & witness testing

- Configure, test and commission houselight / worklight control system - demonstrate and prove all button functions and logic processes.
- Coordinate, demonstrate and prove the interaction between the control system and the houselight & worklight fixtures.
- The specialist contractor should also advise the client and theatre consultant on what they are able to provide a warranty for when it comes to existing equipment and wiring.

SL 1.4 HOUSELIGHT & WORKLIGHT FIXTURES

- Scope: Supply and install blue worklights and control room fixtures, drivers & accessories. Commission / configure with existing houselighting fixtures addresses and behaviour etc.
- Notes: These units are to be incorporated with existing white worklight and houselighting control protocols.
-

Design & coordination

- Provide details of worklight fixtures, layout and proposed DMX channel assignments for approval.
- Coordinate installation details of fixtures with Client and Theatre Consultant.
- In full consultation with the client, remove existing 'SILENCE' signs and Fly Floor Ropes worklights for full-refurbishment and re-fitting as part of the building programme. Submit proposals for refurbishment for approval.
- Arrange refurbishment of 'SILENCE' signs and Fly Floor Ropes worklights.

Installation

- In full consultation with the client, remove any existing containment, wiring and worklights not required as part of the works, that are relevant to the works being undertaken. Once removed, items should be taken away and disposed of/recycled in co-ordination with environmental regulations.
- Supply control room spotlight fixtures, track and light switches to electrical contractor, 'free-issue', for installation by electrical contractor.
- Supply blue worklight fixtures for installation.
- Provide guidance to on-site electricians to demonstrate wiring and termination methods.
- Undertake all First and Second Fix tasks as per the contract, as required.
- In full consultation with the client, remove existing 'SILENCE' signs and Fly Floor Ropes worklights for full-refurbishment and re-fitting as part of the building programme.

Commissioning & witness testing

- Once installation is complete, test and configure fixtures and commission system
- Demonstrate operation of fixtures and system to Client and Theatre Consultant.

SL 1.5 INSTALLATION AND PROJECT MANAGEMENT

Scope:	Provide installation and project management as necessary
Notes:	Refer to Section 1 for details. Submit all samples, drawings and documents in a timely fashion as described in Section 1 of this specification.

Design

- Develop the final selection of equipment and systems design in line with specification.
- Submit all drawings and schedules for approval, along with samples and any technical submittals not previously included with tender, in a timely fashion as described in Section 1 of this specification.

Coordination

- Provide guidance to contractors and project management as necessary during building programme.
- Attend all coordination meetings relevant to this package.

Installation

- Arrange appropriate workshop inspection and tests prior to delivery to site as described in Section 1 of this specification. Liaise with Theatre Consultant over dates and procedure for workshop inspection.
- Supply and install wiring and equipment as noted above.

Commissioning, training & witness testing

- Provide O&M manuals for approval in a timely fashion as described in Section 1 of this specification.
- Fully test and commission all elements of the works and certificate as required in Section 1 - submit test sheets to Theatre Consultant prior to final inspection.
- Notify Theatre Consultant in good time of dates for final site inspection.
- Provide staff and access equipment to assist the Theatre Consultant with witness testing of all stagelighting systems.
- Provide client training (including manufacturers' training courses) and attendance on site as described in Section 1 of this specification on completion of system.

3.2 Audiovisual systems

AV 1.1 INFRASTRUCTURE

Scope: Supply, installation and termination of audiovisual wiring. Supply of backboxes, supply and installation of faceplates for facility panels, supply and installation of equipment racks, patchbays and distribution.

Supply & installation of main distribution boards, power supplies, containment & LV wiring. Installation of backboxes and termination of all mains wiring.

Design

- Clearly highlight any changes to the audiovisual system design intent, and ensure that it remains compatible with Client's brief and any existing equipment to be re-used.
- Submit for approval detailed layout drawing of the control room(s) and AV equipment room(s) showing location of all equipment, power isolators, any critical containment routing and free space required around equipment.
- Submit for approval a detailed audiovisual wiring cable schedule and schematics including allocation and destinations of all audiovisual signal wiring as well as power wiring from audiovisual power distribution boards.
- Submit for approval physical samples of every cable type to be used in the installation, along with manufacturers' product details.
- Submit for approval layout drawings showing location and position of all facility panels.
- Submit for approval detailed rack arrangement drawings and detailed patchbay layout drawings prior to fabrication, clearly indicating any proposed normalling.
- Submit for approval construction drawings of all back boxes and faceplates for approval prior to fabrication.
- Design audiovisual containment system, including containment groups and separation required, and check proposed containment sizing is adequate prior to installation of containment.
- Provide guidance to electrical contractor as necessary on containment connections to audiovisual equipment racks, including inter rack connections.
- Co-ordinate with the electrical sub-contractor any external interfaces required for integration of fire alarm systems or building wide IT integration.
- Check that the power supplies provided for the audiovisual racks and equipment in the control room(s) and AV equipment room(s) are adequately sized, prior to delivery of the racks.
- Attend all electrical coordination meetings relevant to this package.
- Co-ordinate finish and location of all facility panels with Theatre Consultant & Architect.
- Provide guidance as necessary to Architect on detailed installation of facility panels, provision of cover panels and mounting recesses for facility panels where required.
- Coordinate with electrical contractor to ensure labelling of audiovisual power outlets includes correct circuit references.

Installation

- Supply, install and terminate the audiovisual equipment racks in accordance with programme.
- Supply and install all containment required for the stagelighting and audiovisual data cabling
- Supply and install all containment required for the audiovisual power cabling.
- Supply and install facility panels and audiovisual electrical outlets.
- Supply and install containment to racks and facility panels to ensure containment groups are correctly routed, re-using existing containment where appropriate.
- Supply and install all audiovisual wiring in accordance with building programme, including all internal rack wiring and inter-rack links required to allow for all control and distribution equipment to appear on relevant patch bays.
- Supply and install final power wiring links from the audiovisual equipment racks to each local MCB or isolator, and terminate to the appropriate distribution board.
- Supply and install facility panel faceplates.
- Terminate all audiovisual wiring to faceplates.
- Ensure that all wiring and termination for audiovisual power wiring is neat, including dressing of cables within facility panels to allow faceplates to hinge open.

- Supply, install and terminate all audiovisual patchbays in the audiovisual equipment racks to both internal equipment and field wiring.
- Supply and install rack-mounted equipment, switches and interfaces - terminate to patchbays.
- Supply and install patch cords in patchbays as appropriate. Uninstalled patch cords to be handed to the Client as loose equipment.
- Supply and install patching within equipment racks for amplifiers, AD/DA interfaces and DSP interfaces, where appropriate.
- Supply, install and terminate control wiring for power switching system.
- Supply and install UPS units in equipment racks and power distribution within equipment racks. Supply, install and terminate mains switching control system between control room and audiovisual racks.

Commissioning & witness testing

- Configure VLANs on the AV Ethernet network and switches as required in consultation with LVC and the Theatre Consultant.
- Provide, for the purposes of commissioning, any equipment that is required to fully commission and demonstrate the audiovisual infrastructure.
- Provide third party testing results in lieu of test equipment for parts of the infrastructure requiring specialist testing (e.g. fibre optic cabling)
- Provide staff and access equipment to assist the Theatre Consultant with witness testing of the audiovisual wiring infrastructure and all socket outlets on the facility panels.

AV 1.2 AUDIO SYSTEM

Scope: Design, supply and install DSP, loudspeaker and amplifier systems and associated equipment and infrastructure. Supply loudspeakers as loose equipment.

Notes:

Design

- Submit for approval detailed loudspeaker system design showing proposed models, including sound pressure level calculations.
- Coordinate loudspeaker positions and mounting details with Client and Theatre Consultant.
- Submit for approval loudspeaker mounting details prior to manufacture.
- Submit for approval detailed audio system schematic.

Installation

- Supply and install loudspeakers and connect to infrastructure.
- Supply and install amplification and processing and terminate to patchbays.
- Supply additional monitor loudspeakers, and cabling as loose equipment
- Supply and install rigging solution (Truss and chain hoists) for the advance loudspeaker position in consultation with LVC and the Theatre Consultant.
- Connect installed loudspeakers to installed infrastructure.
- Supply and install rack-mounted equipment, switches and interfaces - terminate to patchbays.
- Supply and install DSP and AD/DA equipment in the audiovisual equipment racks and terminate to patchbays.

Commissioning & witness testing

- Commission loudspeaker system, including equalisation, delay time setting and storing of presets for different stage formats.
- Commission and test additional amplifiers and loudspeakers
- Provide calibrated test results proving loudspeaker performance.
- Provide for the purposes of commissioning any equipment that is required to fully commission and demonstrate the loudspeaker system.
- Demonstrate the systems and carry out training as detailed within Section 1 of this specification

AV 1.3 COMMUNICATIONS SYSTEMS

Scope: Supply and install infrastructure for the communications systems,

Design, supply and install stage manager's desk, technical intercom and cuelight systems

Notes:

Design

- Submit for approval detailed communications system wiring schematics, including interfaces between communications systems and any other systems.
- Submit for approval detailed construction drawing of stage manager's desk and patch panel, as well as details of all stage manager's desk controls, prior to construction.

Installation

- Supply, install and terminate cuelight patchbays, nodes and Ethernet switches in equipment racks.
- Supply, install and terminate stage manager's desk connections at the patchbays
- Supply and install wireless intercom antennae and intercom network switch and patchbay in equipment racks.
- Supply stage manager's desk as free-standing equipment and connect to infrastructure.
- Supply cuelight outstations, intercom headsets, beltpacks etc. as loose equipment.
- Test stage manager's desk with wiring infrastructure and all other systems – cuelights, intercom, paging, show relay and worklight control systems – including show relay mute buttons for audio.
- Configure wired and wireless intercom systems to ensure full and complete integration of systems. Program and set gain/limiter settings on intercom base stations and digital zoning where needed.

Commissioning & witness testing

- Provide for the purposes of commissioning any equipment that is required to fully commission and demonstrate the communications systems.
- Fully test and commission the communications systems.
- Demonstrate the systems and carry out training as detailed within Section 1 of this specification.

AV 1.4 ASSISTED LISTENING & AUDIO DESCRIPTION

Scope: Design, supply and install wiring infrastructure and transmitters for the assisted listening systems.

Notes:

Design & coordination

- Submit for approval a system schematic for the assisted listening system infrastructure.
- Submit for approval a system schematic for the audio description system infrastructure.
- Co-ordinate finish and location of Auracast transmitters with Theatre Consultant & Client.
- Submit for approval detailed construction drawing of audio description console carry case.

Installation

- Supply and install Audio show relay in equipment rack and terminate to wiring infrastructure.
- Supply and install Auracast transmitters in the auditorium.
- Supply and install rack-mounted equipment, switches and interfaces - terminate to patchbays.
- Supply headset receivers and charging units as loose equipment.
- Supply audio description console as free-standing equipment and connect to infrastructure.

Commissioning & witness testing

- Provide for the purposes of commissioning any equipment that is required to fully commission and demonstrate this system.
- Fully test and commission the assisted listening and audio description systems
- Provide staff, playback devices and equipment to assist the Theatre Consultant with witness testing of the assisted listening system and audio description system.

AV 1.5 VIDEO SHOW RELAY

Scope: Supply and install camera & display equipment, patchbays and distribution equipment. Interface with buildingwide networks

Notes:

Design & coordination

- Submit for approval detailed video show relay system schematic, including interfaces with other systems.
- Coordinate equipment positions and mounting details for cameras and screens etc with Client and Theatre Consultant.
- Coordinate with Electrical Contractor for interfacing video/audio relay to buildingwide networks.
- Submit for approval equipment mounting details prior to manufacture.

Installation

- Supply, install and terminate patchbays for video signal distribution.
- Supply and install video matrix and terminate to patchbay.
- Supply and install NDI devices and terminate to patchbays
- Install rack mounted monitor in equipment racks.
- Supply, install and set up show relay video cameras

Commissioning & witness testing

- Provide for the purposes of commissioning any equipment that is required to fully commission and demonstrate the video show relay system.
- Coordinate with EC to fully test and commission interfaces to buildingwide networks.
- Fully test and commission the video show relay system.
- Demonstrate that the show relay signal can be received via the NDI- HDMI units supplied.
- Demonstrate the systems and carry out training as detailed within Section 1 of this specification.

AV 1.6 PAGING & AUDIO SHOW RELAY SYSTEM

Scope: Supply and installation of paging system wiring, termination of wiring, supply of processor, amplifiers, loudspeakers, show relay and paging microphones

Notes: Installation of volume control backboxes and all containment is by the SSC on this project.

Design & coordination

- Submit for approval complete wiring schematic for audio show relay and paging system infrastructure prior to installation.
- Provide guidance as necessary on containment to electrical sub-contractor and check sizing is adequate prior to install of containment.
- Submit for approval samples of loudspeakers, volume controls and custom colours.
- Coordinate equipment positions and mounting details for show relay microphone, all loudspeakers and volume control points with Theatre Consultant and Architect.
- Submit for approval construction drawings of volume controls and paging microphones prior to manufacture.
- Undertake testing of the existing paging systems as described in section 2.69 – specifically items 2.69-MIC-CA/920 2.69-PAS-01/TPS and inform the Theatre Consultant and the client on any remedial work required.
- Plan a workshop with the client and Theatre Consultant on the touch screen functionality of the paging system before it is commissioned to develop touch screen layouts.
- Touch screen panel functionality should include: Show relay audio adjustments, compression and limiter, zoning of areas, background music control, playback of pre-recorded announcements (20 minimum). Simple and technical user pages for differing levels of control.

Installation

- Supply and install containment, backboxes for loudspeakers and volume controls
- Supply and install all paging system wiring.
- Supply, install and terminate DSP, processors, preamps, audio distribution and paging amplifiers in equipment rack.
- Supply and install paging microphones, volume controls and loudspeakers.
- Terminate all paging system wiring to volume controls and paging loudspeakers in accordance with building programme.
- Supply, install and configure show relay microphone, DSP, processing and distribution, and connect to assisted listening system, communications systems and paging system.
- Removal of existing paging systems once they have been decommissioned.

Commissioning & witness testing

- Configure and program paging system processor and switches in agreement with Client and Theatre Consultant.
- Program paging processor with suitable routing, equalisation and ducking on paging inputs to reduce audio feedback and optimise sound quality.
- Connect and test show relay signal input and links to technical intercom and assisted listening systems.
- Provide calibrated test results proving loudspeaker performance.
- Provide, for the purposes of commissioning, any equipment that is required to fully commission and demonstrate the show relay and paging system.
- Provide staff and access equipment to assist the Theatre Consultant with witness testing of the paging system and all links to other systems.
- Free-issue copy of processor configuration to Client for future adjustment.

AV 1.7 INSTALLATION AND PROJECT MANAGEMENT

Scope:	Provide installation and project management as necessary
Notes:	See notes in section 1.

Design

- Develop the final selection of equipment and systems design in line with specification.
- Develop a plan for working hours with LVC that enables the venue to function during this work.
- Advise LVC of any periods of time where power needs to be turned off.
- Submit all drawings and schedules for approval, along with samples and any technical submittals not previously included with tender, in a timely fashion as described in Section 1 of this specification.

Coordination

- Provide on-site project management during the whole project
- Co-ordinate fully with LVC to ensure they can keep performances running smoothly during the work.

Installation

- Arrange appropriate workshop inspection and tests prior to delivery to site as described in Section 1 of this specification. Liaise with Theatre Consultant over dates and procedure for workshop inspection.
- Supply and install wiring, containment and equipment as noted above.

Commissioning, training & witness testing

- Provide O&M manuals for approval in a timely fashion as described in Section 1 of this specification.
- Fully test and commission all elements of the works and certificate as required in Section 1 - submit test sheets to Theatre Consultant prior to final inspection.
- Notify Theatre Consultant in good time of dates for final site inspection.
- Provide staff and access equipment to assist the Theatre Consultant with witness testing of all audiovisual systems.
- Provide client training (including manufacturers' training courses) and attendance on site as described in Section 1 of this specification on completion of system.

APPENDIX A

Drawing issue register

GA SET - GENERAL ARRANGEMENT DRAWINGS

DRAWING NUMBER	SYSTEM	LEVEL	SCALE
LVC-CBL-ES-GA-001	ELECTRICAL SYSTEMS	LEVEL L-01	1:100 @A1
LVC-CBL-ES-GA-002	ELECTRICAL SYSTEMS	LEVEL L0	1:100 @A1
LVC-CBL-ES-GA-003	ELECTRICAL SYSTEMS	LEVEL L01	1:100 @A1
LVC-CBL-ES-GA-004	ELECTRICAL SYSTEMS	LEVEL L02	1:100 @A1
LVC-CBL-ES-GA-005	ELECTRICAL SYSTEMS	LEVEL L03	1:100 @A1
LVC-CBL-ES-GA-006	ELECTRICAL SYSTEMS	LEVEL L04	1:100 @A1
LVC-CBL-ES-GA-007	ELECTRICAL SYSTEMS	LEVEL L05	1:100 @A1
LVC-CBL-PAG-GA-001	AUDIOVISUAL SYSTEMS - PAGING	LEVEL L-01	1:100 @A1
LVC-CBL-PAG-GA-002	AUDIOVISUAL SYSTEMS - PAGING	LEVEL O	1:100 @A1
LVC-CBL-PAG-GA-003	AUDIOVISUAL SYSTEMS - PAGING	LEVEL L01	1:100 @A1
LVC-CBL-PAG-GA-004	AUDIOVISUAL SYSTEMS - PAGING	LEVEL L02	1:100 @A1
LVC-CBL-PAG-GA-005	AUDIOVISUAL SYSTEMS - PAGING	LEVEL L03	1:100 @A1
LVC-CBL-PAG-GA-006	AUDIOVISUAL SYSTEMS - PAGING	LEVEL L04	1:100 @A1
LVC-CBL-PAG-GA-007	AUDIOVISUAL SYSTEMS - PAGING	LEVEL O WHOLE SITE	1:100 @A1
LVC-CBL-PAG-GA-008	AUDIOVISUAL SYSTEMS - PAGING	LEVEL L01 WHOLE SITE	1:100 @A1
LVC-CBL-PAG-GA-009	AUDIOVISUAL SYSTEMS – PAGING – EXISTING SYSTEMS MARKUP	GROUND FLOOR WHOLE SITE	1:200 @A1
LVC-CBL-PAG-GA-010	AUDIOVISUAL SYSTEMS – PAGING – EXISTING SYSTEMS MARKUP	LEVEL L01 WHOLE SITE	1:200 @A1
LVC-CBL-PAG-GA-011	AUDIOVISUAL SYSTEMS – PAGING – EXISTING SYSTEMS MARKUP	LEVEL 2 L02 WHOLE SITE	1:200 @A1
LVC-CBL-SLAV-GA-001	AUDIOVISUAL AND STAGELIGHTING SYSTEMS	LEVEL L-01	1:100 @A1
LVC-CBL-SLAV-GA-002	AUDIOVISUAL AND STAGELIGHTING SYSTEMS	LEVEL O	1:100 @A1
LVC-CBL-SLAV-GA-003	AUDIOVISUAL AND STAGELIGHTING SYSTEMS	LEVEL L01	1:100 @A1
LVC-CBL-SLAV-GA-004	AUDIOVISUAL AND STAGELIGHTING SYSTEMS	LEVEL L02	1:100 @A1
LVC-CBL-SLAV-GA-005	AUDIOVISUAL AND STAGELIGHTING SYSTEMS	LEVEL L03	1:100 @A1
LVC-CBL-SLAV-GA-006	AUDIOVISUAL AND STAGELIGHTING SYSTEMS	LEVEL L04	1:100 @A1
LVC-CBL-SLAV-GA-007	AUDIOVISUAL AND STAGELIGHTING SYSTEMS	LEVEL L05	1:100 @A1

WORKING LIGHT SYSTEM – GENERAL ARRANGEMENT DRAWINGS

DRAWING NUMBER	SYSTEM	LEVEL	SCALE
LVC-CBL-WL-GA-001	WORKLIGHT SYSTEMS	LEVEL L-01	1:100 @A1
LVC-CBL-WL-GA-002	WORKLIGHT SYSTEMS ZONES	LEVEL L-01	1:100 @A1
LVC-CBL-WL-GA-003	WORKLIGHT SYSTEMS	LEVEL L0	1:100 @A1
LVC-CBL-WL-GA-004	WORKLIGHT SYSTEMS ZONES	LEVEL L0	1:100 @A1
LVC-CBL-WL-GA-005	WORKLIGHT SYSTEMS	LEVEL L01	1:100 @A1
LVC-CBL-WL-GA-006	WORKLIGHT SYSTEMS ZONES	LEVEL L01	1:100 @A1
LVC-CBL-WL-GA-007	WORKLIGHT SYSTEMS	LEVEL L02	1:100 @A1
LVC-CBL-WL-GA-008	WORKLIGHT SYSTEMS ZONES	LEVEL L02	1:100 @A1
LVC-CBL-WL-GA-009	WORKLIGHT SYSTEMS	LEVEL L03	1:100 @A1
LVC-CBL-WL-GA-010	WORKLIGHT SYSTEMS ZONES	LEVEL L03	1:100 @A1
LVC-CBL-WL-GA-011	WORKLIGHT SYSTEMS	LEVEL L04	1:100 @A1
LVC-CBL-WL-GA-012	WORKLIGHT SYSTEMS ZONES	LEVEL L04	1:100 @A1
LVC-CBL-WL-GA-013	WORKLIGHT SYSTEMS	LEVEL L05	1:100 @A1
LVC-CBL-WL-GA-014	WORKLIGHT SYSTEMS ZONES	LEVEL L05	1:100 @A1

ASSEMBLY DRAWINGS

DRAWING NUMBER	SYSTEM	LEVEL	SCALE
LVC-CBL-SLAV-AS-001	SL BOXES TYPICAL DETAIL	MULTIPLE LEVELS	1:2 @A1
LVC-CBL-SLAV-AS-002	AV BOXES TYPICAL DETAIL	MULTIPLE LEVELS	1:2 @A1
LVC-CBL-SLAV-AS-003	SL DATA RACK TYPICAL DETAIL	LEVEL 1	1:4 @A1
LVC-CBL-SLAV-AS-004	AV RACK TYPICAL DETAIL	LEVEL 1	1:4 @A1
LVC-CBL-SLAV-AS-005	AV BOXES TYPICAL DETAIL 2	MULTIPLE LEVELS	1:2 @A1
LVC-CBL-SLAV-AS-010	SL RACEWAYS TYPICAL DETAIL	LEVEL 3	1:4 @A1
LVC-CBL-SLAV-AS-011	WL CONTROL PANELS TYPICAL DETAIL	MULTIPLE LEVELS	NTS @A1

DETAIL DRAWINGS

DRAWING NUMBER	SYSTEM	LEVEL	SCALE
LVC-CBL-ES-DT-001	CONTAINMENT DETAILS	MULTIPLE LEVELS	NTS @A1
LVC-CBL-ES-DT-002	POWER PANELS	MULTIPLE LEVELS	NTS @A1
LVC-CBL-SLAV-DT-001	EQUIPMENT RACK INSTALL DETAIL	LEVEL N/A	1:5 @A1

SCHEMATIC DRAWINGS

DRAWING NUMBER	SYSTEM	LEVEL	SCALE
LVC-CBL-SLAV-SC-001	SL/1 RELAY SCHEMATIC	MULTIPLE LEVELS	NTS @A1
LVC-CBL-SLAV-SC-002	SL/1 POWER SCHEMATIC	MULTIPLE LEVELS	NTS @A1
LVC-CBL-SLAV-SC-003	SL/1 WORKLIGHT SCHEMATIC	MULTIPLE LEVELS	NTS @A1
LVC-CBL-SLAV-SC-004	AV/1 AV POWER SCHEMATIC	MULTIPLE LEVELS	NTS @A1
LVC-CBL-SLAV-SC-005	AV/2 LOUDSPEAKER SCHEMATIC	MULTIPLE LEVELS	NTS @A1
LVC-CBL-SLAV-SC-006	AV/3 AUDIOVISUAL DATA SCHEMATIC	MULTIPLE LEVELS	NTS @A1
LVC-CBL-SLAV-SC-007	AV/3 BOX TO BOX AUDIOVISUAL DATA SCHEMATIC	MULTIPLE LEVELS	NTS @A1
LVC-CBL-SLAV-SC-008	AV/3 STAGELIGHTING DATA SCHEMATIC	MULTIPLE LEVELS	NTS @A1
LVC-CBL-SLAV-SC-009	PAGING OVERVIEW	LEVEL N/A	NTS @A1
LVC-CBL-SLAV-SC-010	PAGING LINE SCHEMATIC	MULTIPLE LEVELS	NTS @A1
LVC-CBL-WL-SC-001	WL SCHEMATIC	MULTIPLE LEVELS	NTS @A1

DOCUMENTS

DOCUMENT NUMBER	DESCRIPTION	FORMAT
LVC-CBL-SLAV-PSP-001	PERFORMANCE SPECIFICATION – STAGELIGHTING AND AUDIOVISUAL SYSTEMS	A4
LVC-CBL-SLAV-EQS-002	EQUIPMENT SCHEDULE	A4
LVC-CBL-SLAV-FPS-003	FACILITIES PLANNING SCHEDULE	A4

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