DISCLAIMER

The drawings contained in this set of recommendations are adapted from real-world documents used in production. Details have been preserved to show recommended practices for documenting entertainment lighting systems. However, these documentation examples do not imply endorsement of any product, company, or brand by USITT or the authors.

PREAMBLE

The original Graphics Standards Board noted that a standard is an example for comparison and an authority which serves as a model. It should be noted that this model cannot hope to cover all possible situations encountered when creating lighting documents. Instead, it should be viewed as a guide for lighting practitioners. This document, therefore, represents a "recommended practice" or "RP". You are encouraged to use your best judgment in creating documents that are legible, consistent, and meet the needs of the project and those who work on it.

The purpose of this document is to re-establish a uniform language among the theatrical lighting industry. It is intended to provide guidelines for documenting an entire lighting package (including but not limited to: light plots, sections, control system diagrams, device schedules, etc.).

This RP applies to all entertainment lighting related documentation for all applications (ie. project basis or permanent installation) regardless of what method or software was used for creation.

1 INTRODUCTION

Past versions of the "USITT Lighting Graphics RP" included information typically used by lighting designers to communicate their lighting design for a production. It has been adapted into this document that now serves to guide all entertainment lighting documentation, which includes lighting show control and networking documentation.

Documenting lighting designs and the systems that support them requires the creation of multiple different documents. The complete set of documents that provide information on a lighting design and/or a lighting system is called a document package. A Lighting document package typically includes "drawn" or drafted documents, "text" documents, and computer files.

1.1 Document Forms

1.1.1 Drawn Documents

Drawn documents provide a graphic view of lighting equipment and systems used for communicating location and other installation information for lighting equipment. Often, they are created digitally via CAD software and/or can be hand drawn. These drawings are organized into drawing sheets, also called plates, either to scale or not-to-scale. Scaled drawings are used to show the size of objects, the specific location of objects, and how objects fit together once installed. Not-to-scale drawings, such as diagrams, are used to show the functional relationship of objects and connections between objects that may not be physically located next to one another.

1.1.2 Text Documents

Text documents provide a text based version of lighting information that displays large quantities of specific information in a compact format. They are typically created using word processing,spreadsheet programs, and/or industry specific software and can be divided into three categories:

- Schedule Documents: provide information in a table format with rows and columns.
- List Documents: are similar to schedules but do not use the rows and column format.
- Product Documentation: documents created by equipment manufacturers related to the specification and operation of equipment.

1.1.3 Computer Files

While drawn and text documents are often created, shared, and stored as computer files, additional computer files should also be included as part of lighting documentation. This can include lighting console show files, lighting device configuration files, current software or firmware versions, or any other computer file required for show operation, or backup and redundancy purposes.

1.2. Lighting Document Types

A lighting document package can include any of the following documents (reference to section number also listed):

Drawn Documents	Text Documents	Computer Files
Scaled Drawings	*Schedule Documents*	Device Configuration Files
3.1.1 Light Plot	3.3.1 Instrument Schedule	Software or Firmware Version
3.2.1 Lighting Section	3.3.2 Channel Hookup	Lighting Console Show Files
3.2.2 Lighting Elevation	3.3.3 Circuit Schedule	Drawn documents base files
4.7.1 Rack Elevation	3.3.4 Address Schedule	Installation files
4.7.2 DIN Enclosure Elevation	4.5.1 Device Schedule	Programs Software Utilities
4.7.3 Device Details	4.5.2 IP Address Schedule	
3.4 Lighting Set Electrics	4.5.4 Patch Panel Schedule	
3.4 Set Electric Detail	4.5.6 Panel Schedule	
3.4 LED Tape Detail	*List Documents*	
3.4 Lighting Mounting Detail	3.3.3 Shop Order	
3.4 Boom Detail	3.3.3 Equipment List	
3.4 Focus Point Layout	*Production Documentation*	
Not-to-scale Drawings	Equipment Datasheets	
4.4.1 System Control Diagram	Equipment Manuals	
4.4.5 Intraconnect		

Graphic samples of components can be found in each section. At the end of the document, a full system package sample can be found for reference.

The lighting package should be arranged in a similar order to the documents listed above as it provides information from a broad to detailed perspective.

The documenter decides which documents to create and include in a document package. For example, when another department may be utilizing the lighting network, creating a control network documentation package that is separate from the lighting design package is beneficial for communication and installation.

Published lighting document packages are transmitted to the production staff as pdf files that may be emailed or placed in an online-shared location. In many circumstances, versions of the lighting documents in the file format they were originally created in are also included with the document package.

2 GENERAL DOCUMENTATION RECOMMENDATIONS

This section includes general recommendations that should be applied in the creation of lighting documentation in general. It is assumed that users of this RP will apply these general recommendations to the creation of all documents in addition to the document specific recommendations included later.

2.1 Document Identification

All documents that are included in a lighting document package should be given a name that communicates the content of the document. Text documents should have a header and footer with: document title, project name, date of modification, page number of total number of pages. Drawn documents should refer to section 2.3.6 for their identification.

A title page or cover sheet including a list or index of all documents can be utilized for larger lighting document packages.

2.2 Limiting Information Duplication

Special attention should be given to the demands of the lighting profession that necessitate quick documentation, and the need to make updates in the field during a rushed load-in. For this reason, the inclusion of duplicate information on multiple drawing sheets is discouraged.

2.3 Drawn Document Recommendations

In this RP there are several references to the USITT - Graphics Recommended Practice Version 5.0 (USITT-GRP). The USITT-GRP can be found on the USITT Technical Production Commission webpage: www.usitt.org/technical-production-commission.

2.3.1 Drawing Scale, Size, and Display Method

Drawn documents should be laid out in an arrangement that will fit on paper sizes listed in USITT-GRP Section 5. Scaled drawings should follow recommendations in USITT-GRP Section 6 allowing the documentation to be printed and/or viewed on screen at the user's discretion.

2.3.2 Text Sizes, Drawing Notations, and Dimensions

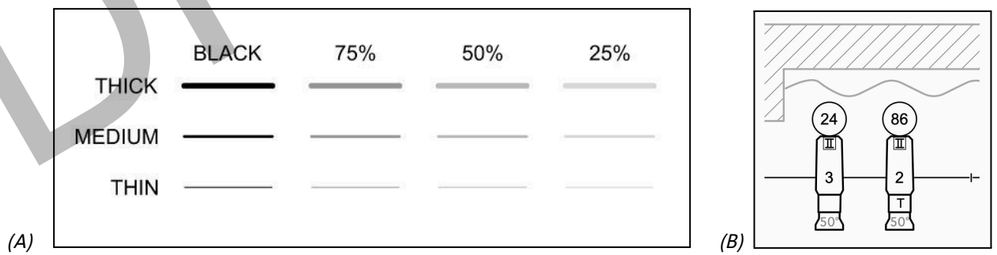
Follow the recommendations on notations and text in USITT-GRP Sections 3 and 8.

2.3.3 Line Weights and Opacities

Follow the line recommendations in USITT-GRP section 2 except as modified or added to in this section and the sections on creating specific lighting documents.

Drawn documents use lines to communicate information. By changing how light or dark lines appear on a drawing a drafter can clarify the difference between two adjacent drawn elements or add emphasis to important objects on the drawing. A drafter can change how light or dark a line appears by changing the line width and/or by changing the line opacity.

- Thick lines:
  - Perimeter of lighting instrument symbols on light plots
  - Perimeter of lighting devices on plan and section view drawings
- Medium lines:
  - Lighting positions on light plots, plan views, or sections
- Thin lines:
  - Details within lighting instrument symbols on light plots
  - Details within lighting devices
  - Dimension lines, extension lines, leader lines
- Reduced line opacity and/or use gray color
  - Deemphasize background information like scenery or architectural information on light plots and other plan view drawings.



(Figure 2.3.3.0.1: (A) Different line weights and grayscale/opacity.(B) Use of grayscale lines for performance venue architectural lines to focus visual attention on lighting devices.)

2.3.4 Line Types

In lighting documentation different line types (solid, dashed, dotted, and other repeating patterns) can be used to represent different cable types. Line types used to represent cable types should include a label to clarify the meaning of the line and an example of the line type and its meaning should be included in the label legend.

(Figure 2.3.4.0.1: Different line types with labels to clarify the meaning of a line.)

2.3.5 Color

Color can be useful for differentiating the meaning of lines or adding emphasis to something on a drawing. Drawing objects in color on a light plot or other lighting drawings should be done sparingly and only to clarify specific information and following the guidelines below:

- Black: majority of information including instruments, devices, electric pipes, keys, notes, etc.
- Gray and/or reduced line opacity: all scenic elements or other elements that require awareness but not attention
- Colors: giving special attention. Be sure lines are clearly visible when printed on white paper. Lighter colors are harder to see when printed on white paper, especially if the line is also drawn in a lighter line weight. (See figure 2.3.5.0.1)
    - Red should be avoided as a line color and reserved for drawing markups or important notes.

However, when deciding whether to use color on drawings these two recommendations should be followed:

1. For the accessibility of users with color vision disabilities it is recommended that colored lines be used only in conjunction with other methods of line differentiation, such as line weight, line type, gray scale, and/or line labels.
2. Check to make sure all members of the production team have access to color printing before using it as a drafting element.

(Figure 2.3.5.0.1: Varying colors in varying line weights)

2.3.6 Title Blocks and Sheet Borders

All drawn lighting documents should include a sheet border and title block on each drawing sheet to aid in drawing identification.

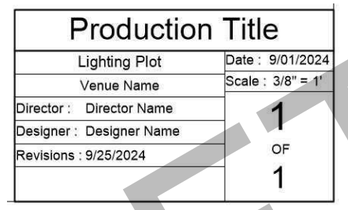
For lighting documentation, it is advised to include the following information in the title block in addition and/or substitute for what is recommended in USITT-GRP section 8.2.

To be placed in the order deemed most important by the lighting designer:

Name of producing organization
Name of production
Name of venue
Drawing title
Drawing sheet number
Predominant scale of drawing
Date the plate was published
Revision number and date
Lighting Designer

Additional Information may include:

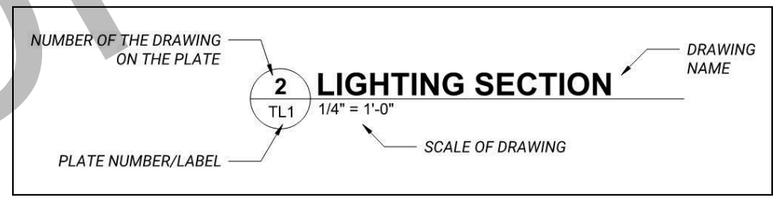
Location of the Venue
Director of the production
Other designers & production members
Lighting Assistant & Head Electrician
Drafter
Drawing Approval
Contact Information
Union & Production Logos
Notes on implementation



(Figure 2.3.6.0.1: Sample title block)

2.3.7 Drawing Labels

When more than one drawing is included on a plate, a drawing label should be included with each drawing. A drawing label is used to identify each drawing with a name and a number. The drawing number is often used to cross reference the drawing on other plates in the drawing set. Additional information related to that drawing may also be included in the drawing label. See USITT-GRP Section 9, Drawing Label.



(Figure 2.3.7.0.1: Example of drawing label.)

2.3.8 Graphic Symbols Recommendations

This section provides guidelines for the creation and use of lighting equipment symbols used on both scaled drawings and diagrams that are not drawn to scale.

2.3.8.1 General Lighting Symbols

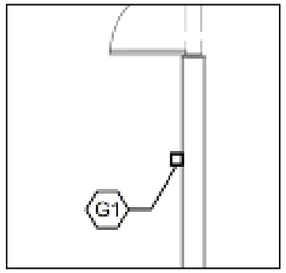
A unique symbol should be used for each type or variation of equipment. Symbols for different iterations of the same equipment type should use simple graphic variation such as the addition of a line or a letter. Each symbol should be included in a legend with a definition for the symbol.

Detailed symbols specific to manufacturers' products and/or supplied via computer drafting programs may be used or may be created by the drafter. But all symbols should follow the recommended line weights as outlined in Section 2.3.3.

Follow these recommendations when drawing symbols on plan, section, or elevation drawings:

- Draw symbols as close as possible to the size and shape of the real object in scale and locate them on the drawing at their real-world position.
- Use a small rectangle with a leader line connected to a device ID as the symbol for devices that are too small to be clearly seen when drawn in scale. Draw the rectangle to approximate the size of the device in scale. The device ID allows the symbol to be

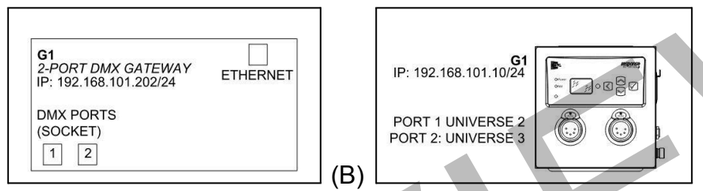
cross-referenced with a device schedule that includes specific details for each device. (See figure 2.3.8.1.0.1)



(Figure 2.3.8.1.0.1: Rectangle used as a symbol with a Device ID connected to the symbol with a leader line.)

Follow one of these two recommendations when drawing symbols on diagrams or drawings not-to-scale:

1. Draw a geometric shape like a rectangle or a simplified outline of the real object's shape. Add graphic representations of important parts of the device represented by the symbol. (See figure 2.3.8.1.0.2.A)
2. Import or draw a realistic looking image of the device represented by the symbol. A scale drawing of the object may be used but it can be enlarged or reduced as needed for use on the diagram. (See figure 2.3.8.1.0.2.B)



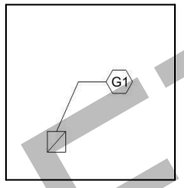
(Figures 2.3.8.1.0.2: (A) Example of a symbol created from a geometric shape. (B) Example of symbols created from a realistic image of the device.) Graphic B provided courtesy of ETC.

2.3.8.2 General Symbol Information Fields

Symbols for different types of equipment or for equipment on different drawings may include different information fields. Follow these general recommendations for symbol information fields.

- Information fields may be included with lighting symbols to provide data specific to each piece of equipment represented by a symbol.
- Information fields can be located both inside and/or adjacent to symbols and appearance should remain consistent with all instances of that symbol.
- Information fields can be emphasized by utilizing container shapes (Simple geometric shapes like a circle or rectangle located adjacent to the symbol that the information field is placed inside.)
- Location and meaning for each information field should be included in the drawing legend.
- Equipment schedules should be utilized if not all information fields can be drawn with clarity on a plate

For additional information on drawing symbols for use on specific drawing types and examples see sections 3 and 4.

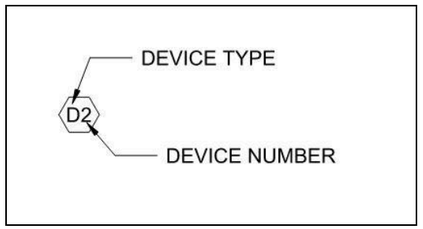


(Figures 2.3.8.2.0.1: Device ID emphasized by placing it inside a container shape.)

2.3.8.3 General Device and Symbol Identification

At a minimum, an information field with a unique device identifier should be included with the symbol for each piece of lighting equipment to make it possible to identify and cross reference each lighting device on drawings, schedules, and any other documents that include an instance of that device. (ie. a unit number on a lighting fixture, a label for a lighting position, a device label for a gateway)

A letter, letter combinations, and/or words can be used to create the device type portion of a“Device ID” to communicate a particular type of device. For example, “N” could be used to indicate a lighting control network infrastructure device. A number is then used after the letter(s) to create a unique device ID for each device of that type. Numbers are typically assigned sequentially but gaps are allowed. (See figure 2.3.8.3.0.1)



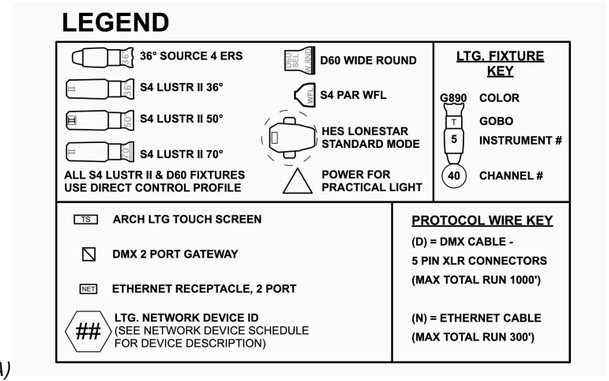
(Figure 2.3.8.3.0.1 – Example of parts that makeup a Device ID.)

Device IDs should be drawn in a way that stands out from other information fields. This can be accomplished by increasing font size, bolding, or italicizing the Device ID compared to other information fields, or by placing the Device ID inside a container shape connected to the symbol with a leader line.

2.3.8.4 General Label Legend and Keys

All drawn lighting documentation must include a guide that provides information on how to interpret the meaning of symbols, lines, information fields, and any other graphic convention used on the drawings. This guide can be called a legend or key and is typically divided into two sections. One section includes symbol examples with definitions, and the other section includes the location and meaning for information fields. Some drafters identify the section with symbols as the legend and the section on information fields as the key, and others do the reverse. In common practice both terms are used interchangeably, but they should be used consistently throughout a document

package. The term legend is used in this RP to refer to both sections of the guide. (See figure 2.3.8.4.1)

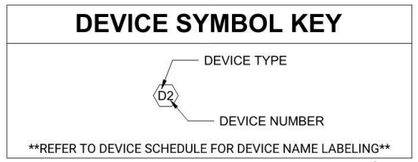


(A)

WIRE KEY

LABEL	DESCRIPTION	SIGNAL
X	BELDEN #9729. (HOME-RUNS TOPOLOGY).	DMX OUT
N	BELDEN #1583A. (HOME RUN TOPOLOGY).	NET
D	BELDEN #9729. (DAISY CHAIN TOPOLOGY).	DMX IN

(B)



(C)

(Figures 2.3.8.4.0.1: (A) Combined legend example showing typical division into two sections. (B) wire key sample (C) generic device symbol key sample) (See also figure 4.4.3.2.1 for example of cable legend)

A legend may be placed in any location on a drawing sheet that does not conflict with other information. The same legend encompassing all document set information can be used on every drawing sheet in the same location, or individual legends can be created for each respective plate's information. A legend may be separated into different parts that focus on specific information.

At a minimum a legend should include examples of each symbol and the corresponding symbol definition as well as a diagram showing the standard placement and meaning for information fields. The following additional information may be included in the legend:

- Instrument or device manufacturer and model
- The required quantity of each device type
- Beam angle for each instrument type if not notated in instrument's name
- Wattage (total instrument load) and/or ANSI lamp code
- Indication of device voltage
- Device settings (ie. operation mode, personality, software version, etc)
- Designation of all notations associated with each instrument.
- Color manufacturer designation (e.g., R = Rosco, L = Lee, G = Gam, etc.)
- Symbols for any accessories – gobos, irises, color scrollers, top hats, barn doors, etc.
- Gobo (or template) manufacturer designation (when applicable)
- Representation of "two-fers"
- The meaning of abbreviations used on the drawing sheet
- Notes and instructions related to devices used in that lighting design or lighting system.

2.4 Text Document Recommendations

Information fields used in drawn documents can be represented via schedule or table format as another means of gathering information. Text documents should follow a cohesive but condensed presentation style. When able, all schedules, lists, and tables should follow a similar formatting style across all schedules for easy reading. All documentation should be identified with a title to describe the information presented.

Equipment datasheets and manuals provided by manufacturers can be included in the lighting package for reference.

3 LIGHTING DESIGN DOCUMENTATION

3.1 Light Plot

The Light Plot is a map that graphically represents the physical components of a lighting design, showing the position of all the instruments and electrical devices used to provide illumination and visual effects for a production with a unique identifier. Usually drawn in a ground/top plan view, it also shows their physical relationship with the other elements of the show and architecture of the venue. It may also display other attributes, such as color, dimmer/address and channel assignments relative to each individual unit.

The Light Plot is a composite plan drawing that provides a descriptive view of the instruments so that the production staff can accurately execute the design and intent. Different hanging positions and the playing area can be compressed in a light plot, or separated into separate plates representing different hanging positions. The front of house plan, for example, might be on one sheet while an over stage plan is on another. While this may improve comprehension of the overall design, care must be taken to ensure that the separation between hanging positions on different documents is clear and concise.

3.1.1 Information Contained in the Light Plot

The light plot should include all information necessary to assure clear understanding of the designer's intentions.The location and identification data of every instrument, accessory, and specialty unit should be represented on the light plot, or accompanying documentation if space does not permit, along with the following information:

- The centerline
- The proscenium arch, plasterline, smoke pockets, or other architectural details necessary to orient the lighting design in the space
- A ground/top plan locus point from which all measurements are taken. In a proscenium theatre, that might be the intersection of the centerline and plasterline, or centerline and set line. In a non-proscenium space the location can be the edge of the playing area, scenic design's plaster/center line, or a corner of the architectural space.
- A lineset schedule, when appropriate
- Indicator of distance left and right of centerline, in scale
- Indication of on-stage distances up and down stage (or the 90° axis to centerline) in scale
- A drawn representation of the edge of the stage, where applicable
- A drawn representation of the edge of the playing area, where applicable
- Basic scenic elements
- Scenic masking

- Architectural and scenic obstructions
- All lighting hanging/mounting positions, labeled, with measurements from the locus point
- All locations of ladders, box booms or booms indicated on the plot using a shaded or hatched footprint of the element
- Trim measurements for adjustable mounting positions. They should read from the stage level surface (or other common point of reference) to the pipe (or mounting position), where applicable
- Elevation heights to boom positions measure from bottom of the boom base to the side arm or clamp, where applicable
- The legend or instrument key denoting symbol type and notation (see Section 2.3.8.4)
- The title block (see Section 2.3.6)

Additional information may include:

- Lighting focus areas
- Lighting Legend/key
- Template key
- Color key

3.1.2 Lighting Instruments

Lighting instruments should be shown on a light plot as symbols and drawn to scale, unique to each instrument type used. Each symbol should be placed so that its location reflects its exact hanging point. Unless otherwise noted, the default spacing between typical fixed focus instruments is 18" (or 45 cm) to allow for adequate focus range of each instrument, on average. When the symbols are placed in relative locations other than the default, dimension lines or other measuring notations should be added to indicate the distance and to facilitate mounting the instruments. It is common that instruments are drawn on the 90˚ axes relative to the hanging positions.

Each symbol should be accompanied by the following information:

- Instrument number
- Channel (or control designation)
- Indication of beam angle as part of the symbol, where appropriate.
- Indication of any accessories with separate power or control, such as scrollers, gobo rotators, etc
- Indication of any accessories such as templates, irises, top hats, barn doors, etc.
- Axis notation for directional filters and/or PAR lamps, when appropriate.

Additional information may include:

- Focus notation
- Wattage and/or voltage of the instrument
- Address, universe, circuit and/or dimmer number or space for the electrician to add this information.
- Ganging information such as "two-fers"
- Color notation
- Gobo (or template) notation

3.1.3 Designation and numbering of lighting positions

3.1.3.1 Numbering lighting positions and instruments for proscenium venues

Numbering positions are in the order, as follows:

- Front of House (FOH) positions parallel to plasterline number nearest to plaster line to furthest
- Onstage overhead electrics parallel to plasterline number from downstage to upstage.
- Onstage booms number from downstage to upstage.

Each instrument receives a unique whole number based on its location and position.

- If an instrument has an attachment that alters the beam of an instrument, the attachment will be referred to by the host instrument's number.
- Instruments on hanging positions perpendicular to centerline (e.g., battens) are numbered from stage left to stage right.
- Instruments on onstage booms or other vertical hanging positions are numbered from top to bottom, then downstage to upstage. Instruments hung at the same height are numbered downstage to upstage before dropping to the next tier of instruments below.
- Instruments mounted on FOH positions parallel to centerline should number starting with the units nearest to the plaster line.
- Instruments mounted on FOH positions non-parallel to centerline (box booms) should number starting with the units closest to centerline.
- Instruments that are inserted between previously numbered fixtures are assigned the lower instrument's unit number plus an additional letter (e.g., 3A or 3B).
- Instruments with multiple control channels or attributes can be represented through a whole number designation of the unit number with a decimal point and number representing specific attributes for the instrument (e.g., 23.1, 23.2 and 23.3) displayed in accompanying non-graphic data.

3.1.3.2 Numbering instruments and positions in non-proscenium venues

Pipe grid positions should be designated by numbers on one axis of the grid and by letters on the other axis.

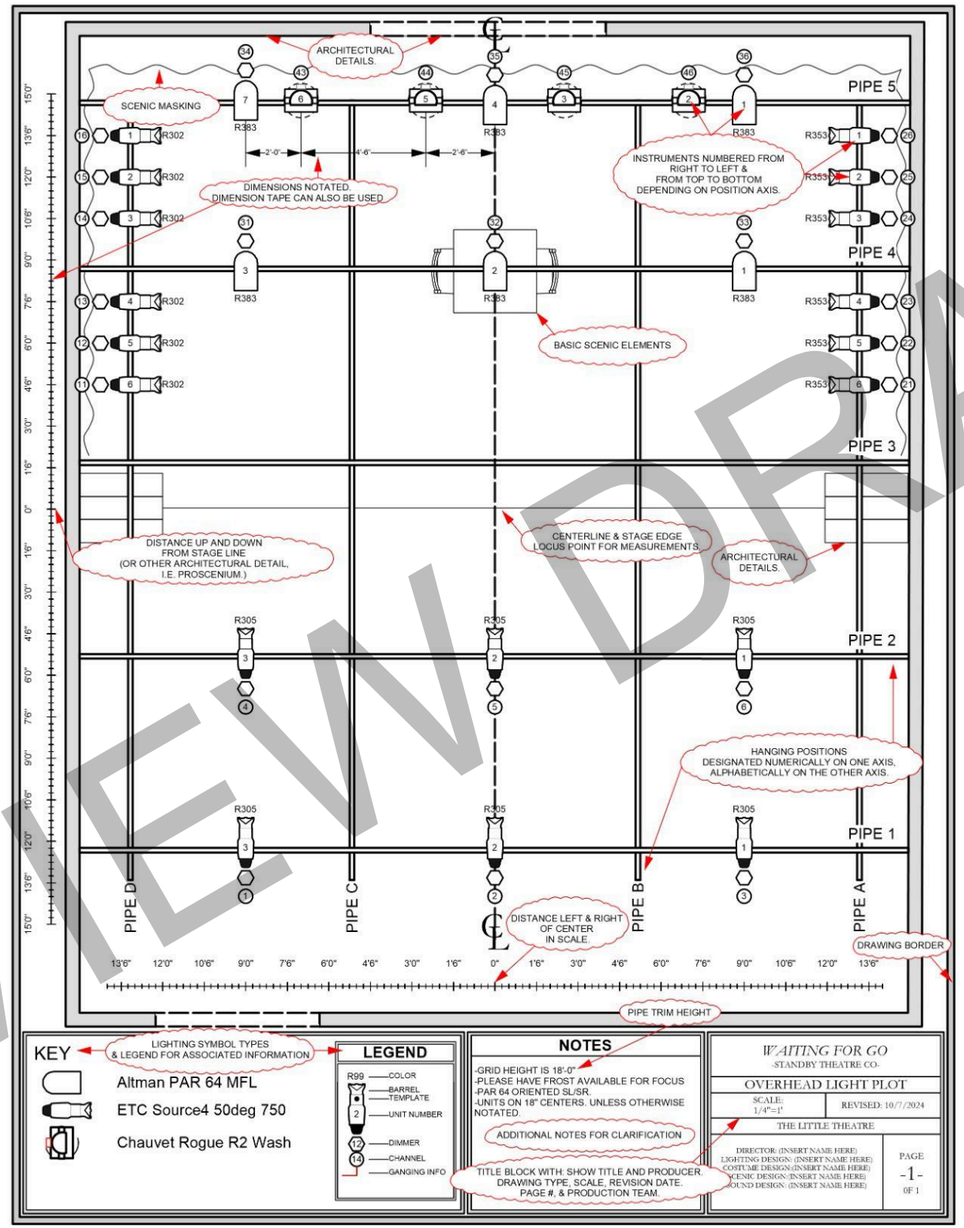
- Other atypical mounting positions may be designated by compass points or numbering in a clockwise manner.
- Mounting positions that repeat should be numbered from a consistent starting point.
- Other atypical hanging positions should be designated in a fashion that is sensible to the electricians. Instruments hung in these positions should be numbered in an intelligible fashion compatible with other instrument designations on the plot.

3.1.4 Generic Graphic Lighting Instrument Symbols

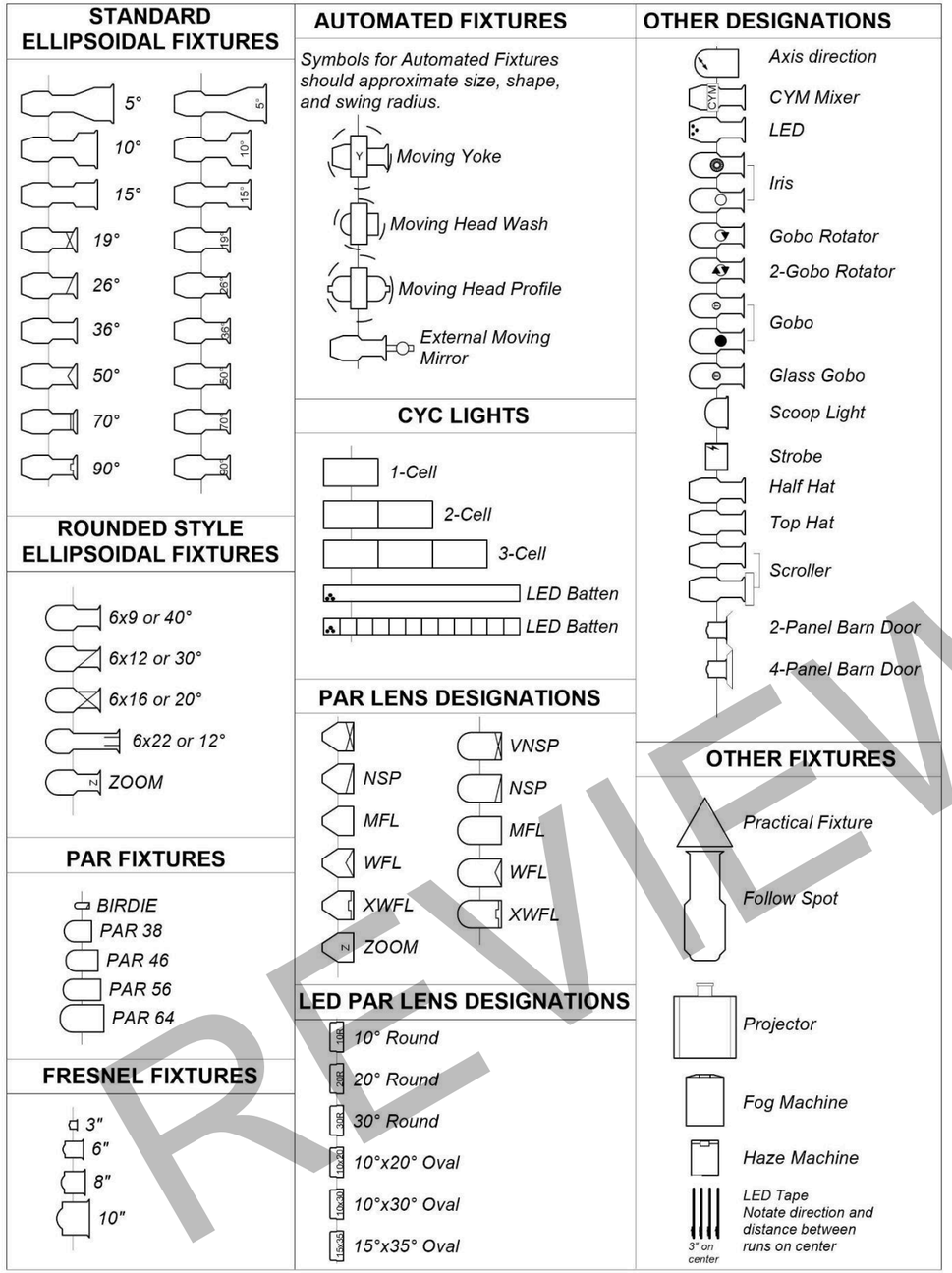
The symbols that follow represent a selection of standard generic symbols that approximate the size and shape of stage instruments and are presented as a guideline. Further differentiation or notation may be necessary to distinguish between instruments of approximately the same size. Specific choices should be considered to differentiate between different manufacturers of the same type of instrument.

Because of the number and complexity of attributes in automated fixtures, each designer must determine a logical notation system for those instruments used. Likewise, designers must choose a notation system to reflect current LED fixtures with multiple attributes.

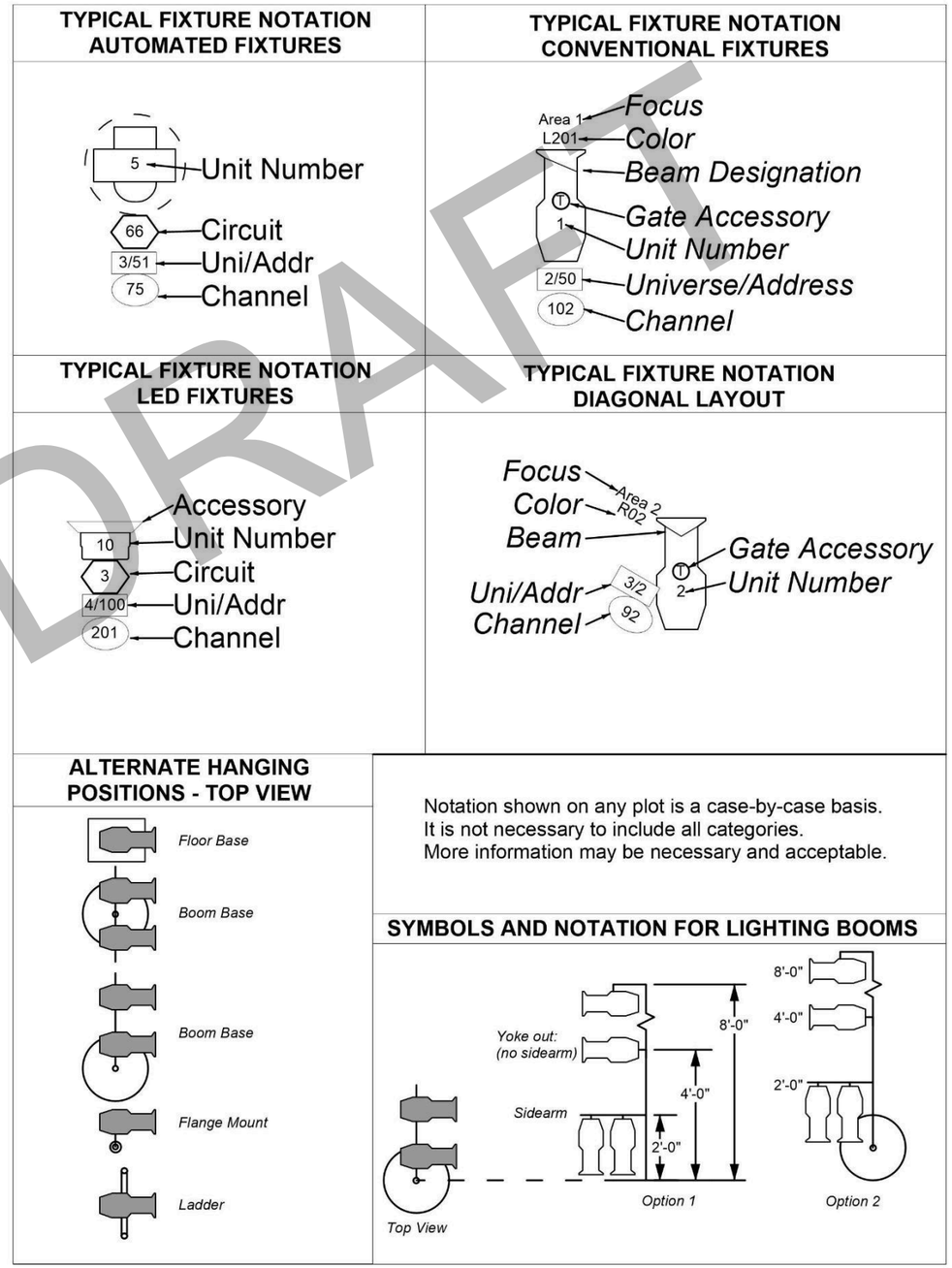
(Figure 3.1.4.0.1 : Parts of a light plot Proscenium Style to come in final publication)



(Figure 3.1.4.0.2: Parts of a light plot Pipe Grid Style)



(Figure 3.1.4.0.3: Symbol Samples)



(Figure 3.1.4.0.4: Symbol Notations)

3.2 The Lighting Section & Elevation

The Lighting Section is a side elevation view in which the cutting plane intersects the theatre, typically along the centerline, but may intersect any plane that best illustrates the mounting positions. This drawing provides a descriptive view of the hanging positions relative to the architectural and scenic elements of the production. While it may be appropriate to compress distance (horizontal or vertical) in a presentational section, doing so in the working version reduces its effectiveness.

3.2.1 Information contained in the Lighting Section

The purpose of the lighting section is to communicate spatial information and relationships of all other elements relative to the lighting design. The following information should be represented on the lighting section:

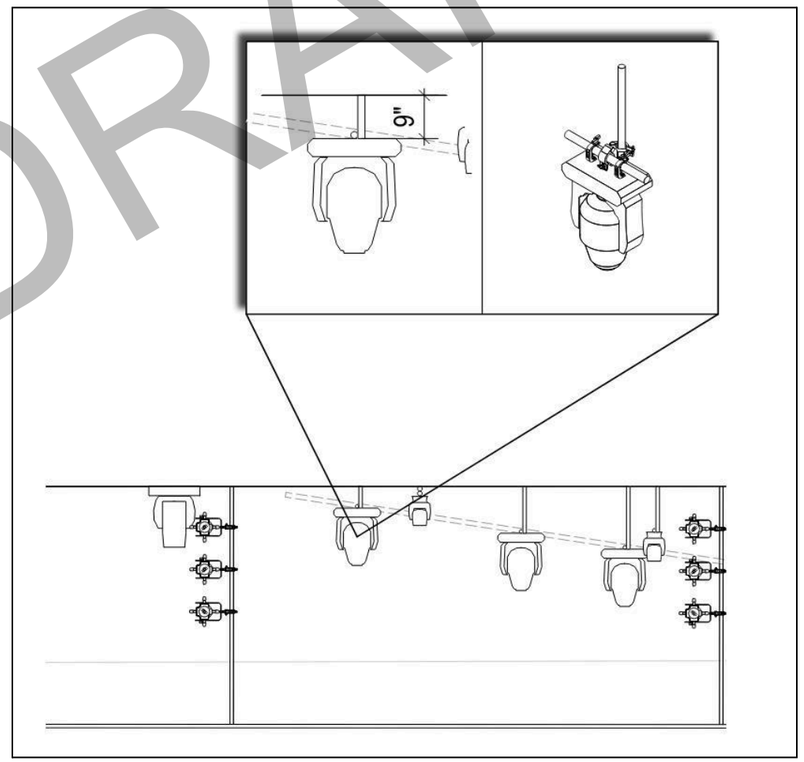
- Definition of where the section is "cut."
- Stage floor, deck, or "vertical zero" location (indication of which one is used as reference zero)
- Proscenium, plaster line, smoke pocket, or the "horizontal zero" location
- Back wall or upstage limitation of the performing space
- Vertical audience sight points and/or sightlines
- Downstage edge of stage floor and/or edge of playing area
- Architectural details necessary to orient the lighting design in non-proscenium spaces
- All hanging positions including side elevation of booms, ladders, etc.
- Trim height for all hanging positions that can change height, including multiple playing heights
- Identification of all lighting positions
- Architectural and scenic obstructions
- Sectional view of scenery
- All masking
- Title block (See Section 2.3.6)
- Scaled representation of the instruments that determines batten height mounted in each position
- Human figure (or "head height") in scale
- The orchestra pit and it's height position (or positions), as applicable

Additional information may include:

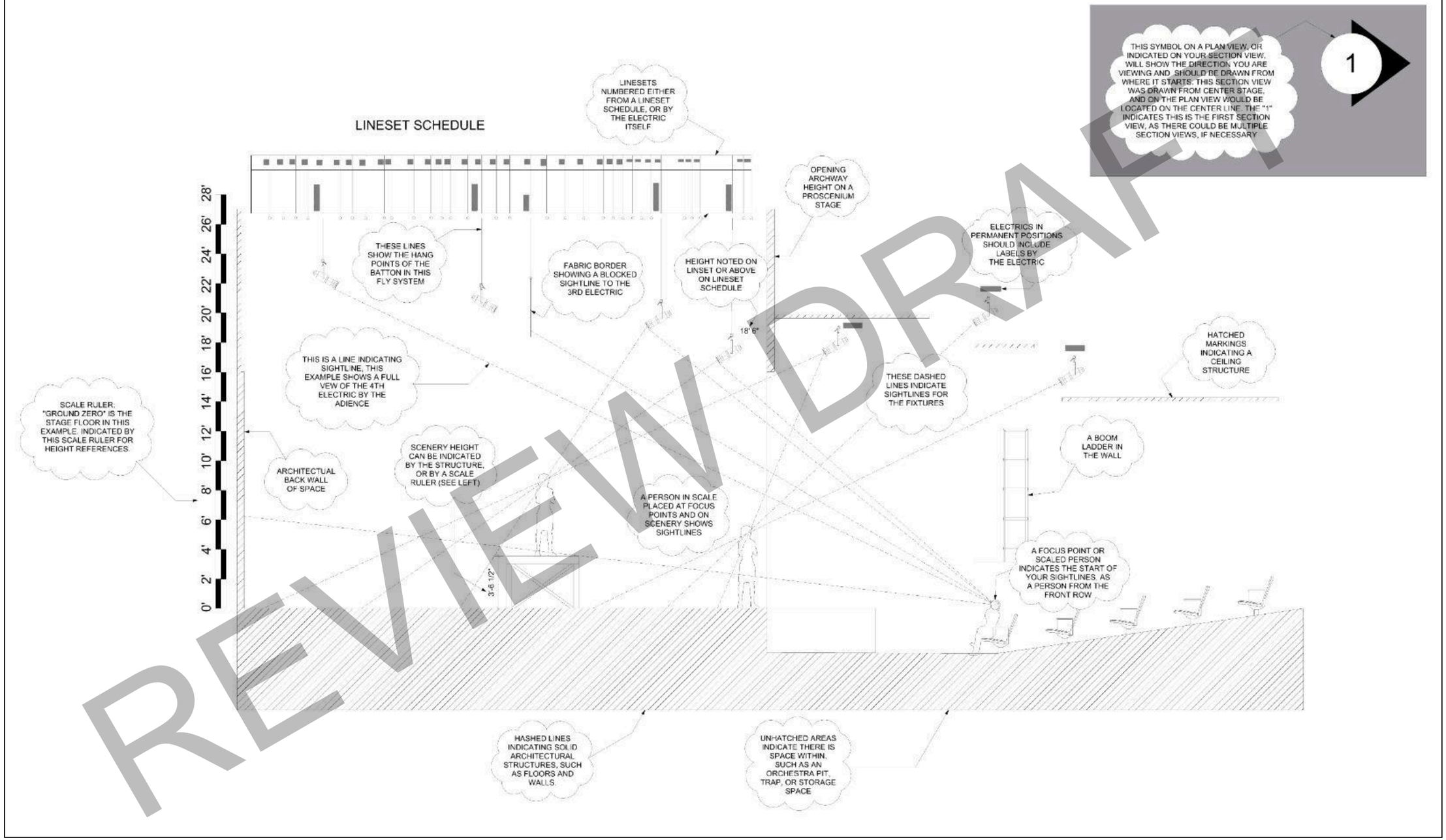
- Vertical indicator of distance in scale
- Horizontal indicator of distance in scale
- Defined distance to other elements not shown on the drawing ("Actual Throw Distance") to follow spot locations, or to other sightlines, etc.
- Beam spreads for specific instruments showing overlap of system focus from different hanging positions.

3.2.2 The Lighting Elevation

While a lighting section demonstrates the lighting positions, fixture angles, trim heights, sightlines, and beam spreads; a lighting elevation drawing can be included in a package separate from the lighting section. Similar to a scenic elevation, a lighting elevation shows lighting elements that are more complex than those hung on a traditional lighting pipe. (ie. custom installations and fabrication needed for specific fixtures and/or hanging positions).



(Figure 3.2.2.0.1: Lighting elevation mounting detail)



(Figure 3.2.1.0.1: Parts of a lighting section)

3.3 Lighting Design Paperwork

The text based documents typically included with the light plot and lighting section are often called "paperwork." Different production teams may require different paperwork. The minimum requirement for lighting design paperwork includes an instrument schedule, channel hookup, and shop order.

All paperwork includes similar information about each lighting instrument, organized in different ways. Instrument number, hanging position, circuit number, circuit name, dimmer number, channel number, DMX assignment, gel color designation, focus area or focus point, gobo designation, wattage, voltage, and the like are examples.

3.3.1 Instrument Schedule

Instrument Schedule paperwork is organized by hanging position, followed by instrument unit number. All of the above information about each light is included.

LD: [Designer Name]
ALD: [Designer Name]

[Show Name] Instrument Schedule
[Production Company]

Revision Date
Lead Electrician

Position	Unit	Instrument	Chan	Univ	Addr	Color	Color2	Gobo
Boom 2 SL	1	ETC Source4 36deg	355	1	144	R99		R71043
	2	ETC Source4 LED2LS 50deg	366	2	186	R119		
	3	ETC Source4 70deg	181	1	146			
	4	ETC Source4 36deg	356	1	143	R99		R71043
Boom 2 SR	1	ETC Source4 36deg	352	1	167	R99		R71043
	2	ETC Source4 LED2LS 50deg	364	2	166	R119		
	3	ETC Source4 70deg	181	1	164			
	4	ETC Source4 36deg	353	1	168	R99		R71043
Cat 2 Lower	1	ETC Source4 26deg	110	1	77	R53	R119	
	2	ETC Source4 19deg	115	1	76	R53	R119	
	3	ETC Source4 26deg	109	1	75	R53	R119	

(Figure 3.3.1.0.1: Instrument Schedule Sample.)

3.3.2 Channel Hookup

Channel Hook Up paper work is organized by channel number, with all of the above information tracked for each light.

LD: [Designer Name]
ALD: [Designer Name]

[Show Name] Channel Hookup
[Production Company]

Revision Date
Lead Electrician

Chan	Univ	Addr	Instrument	Purpose	Watts	Position	Unit	Color	Color2	Gobo	Focus
1	3	312	Elation Seven PAR 19IP	Top	500 W	1st Electric	11				
2	3	282	Elation Seven PAR 19IP	Top	500 W	1st Electric	8				
3	3	253	Elation Seven PAR 19IP	Top	500 W	1st Electric	5				
4	3	297	Elation Seven PAR 19IP	Top	500 W	1st Electric	10				

(Figure 3.3.2.1: Channel Hookup Sample.)

3.3.3 Circuit Schedule

A circuit schedule is a table listed by circuit number illustrating all units powered by the respective circuits.

[Name of Show]
Circuit Schedule

Page X of Y
Revision Date
Show Paperwork.file

B82

Cir#	Dim	Addr	Chan	Pos & Unit#	Inst Type & Access & Load	Color & Gobo	Purp
	33	33	(122)	#43	65Q 6" Fres 575w	R05	

A56

Cir#	Dim	Addr	Chan	Pos & Unit#	Inst Type & Access & Load	Color & Gobo	Purp
	32	32	(81)	#32	Alt 360Q 6x9 750w	R02	

(Figure 3.3.3.1: Circuit Schedule Sample)

3.3.4 Address Schedule

An address schedule is a list of every address used and what fixture and its location corresponds to which address. It can also illustrate universe assignments for multiple universes used in various locations.

[Rep Plot]
DMX Address Hookup

Page X of Y
Revision Date
Rep_Final.file

Address	Chan	Position	U#	Inst Type & Access & Load	Purpose	Clr & Gbo
1/167	(121)	1st Electric	75	ETC S4 26° 750w		R132
1/168	(122)	1st Electric	76	ETC S4 26° 750w		R132
1/169	(123)	1st Electric	77	ETC S4 36° 750w		R132
1/173	(208)	1st Electric	72	ETC S4 50° 750w	S/P	
1/174	(43)	1st Electric	74	ETC S4 PAR WFL 575w	WRX	
1/175	(20)	1st Electric	73	ETC S4 36° 750w	O	R132

(Figure 3.3.4.1: Address Schedule Sample)

3.3.5 Shop Order or Equipment List

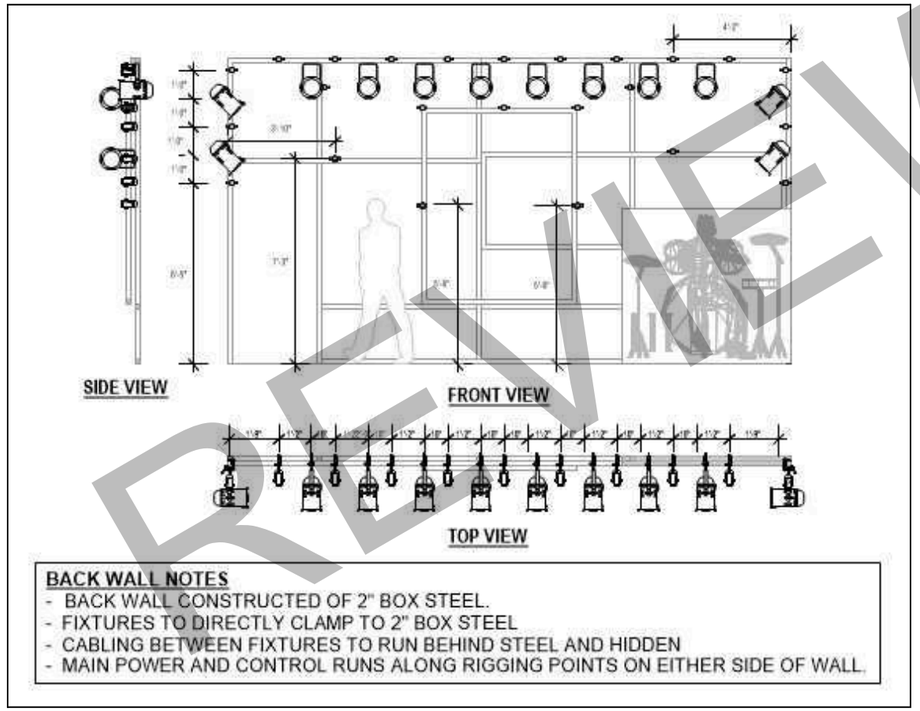
A shop order is an equipment list. A shop order defines needed instrumentation, accessories, color, gobos (or templates), dimmer and control equipment, hanging positions not native to the performance space, cabling, and anything else needed to accomplish the lighting design. This paperwork might be broken down to reflect items that the producing theatre, or venue, has in stock. This list also specifies additional rentals needed, or recognizes a full rental package going into the venue. Each and every piece of equipment needed would be indicated on the Shop Order. The shop order might be organized by hanging position or by instrument inventory, as long as all needed items are specified.

(Figure 3.3.5.1: Address Schedule Sample to come in final publication.)

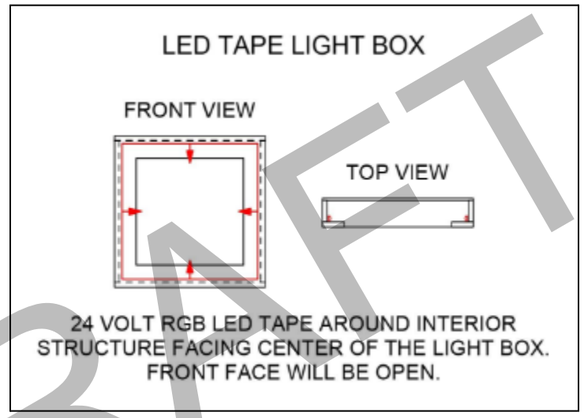
3.4 Other Lighting Design Documentation

When lighting designs become more complex, additional documentation may be necessary to adequately communicate all components of the lighting design. Additional plan, section, elevation, and/or detail drawings may be needed to document the following example situations as well as others.

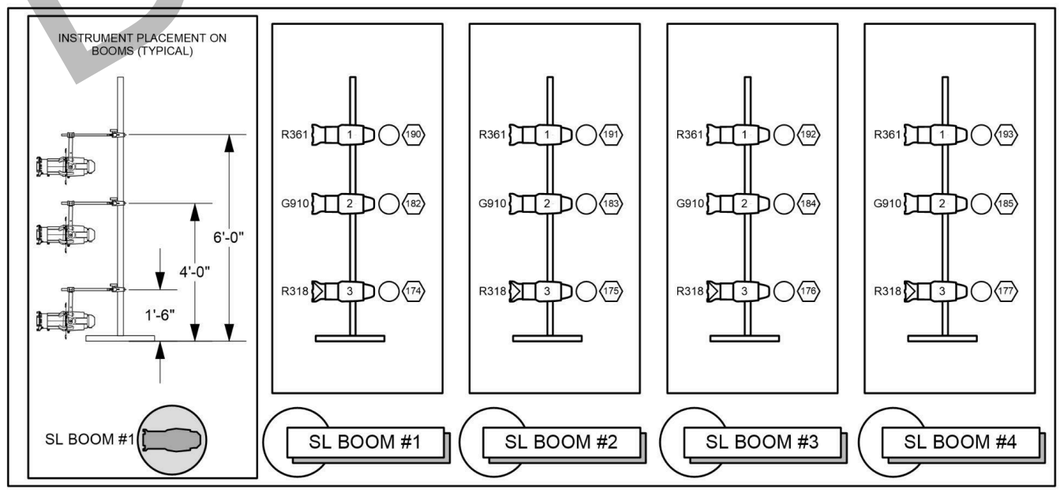
- The addition of lighting equipment to scenery.
- The use of multiple LEDs or other small light emitters distributed on stage or in the front of house.
- The addition of new lighting positions in a performance venue.
- Extensive use of booms or ladders beyond what can fit on a light plot.
- Hanging pendant lighting fixtures or other fixture types suspended at different heights above the stage.
- Documenting multiple lighting instruments at stage level.
- Designing a lighting rig that moves or changes configurations during the performance



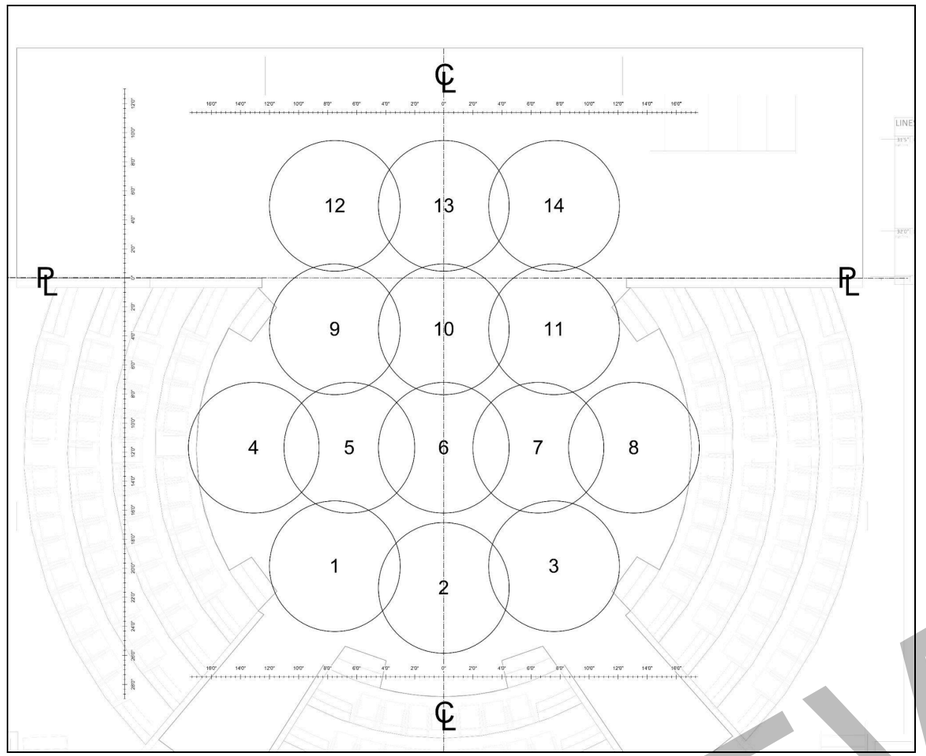
(Figure 3.4.0.1: Set Electrics detail)



(Figure 3.4.0.2: LED tape detail)



(Figure 3.4.0.4: Boom plate/detail)



(Figure 3.4.0.5: Focus Point Layout)

4 Lighting Control System Documentation

Modern lighting designs can be broken down into three broad equipment categories: lighting instruments and effects, power distribution, and lighting control and data distribution. While a light plot and instrument schedule still provide sufficient documentation for how lighting instruments are circuited to power, newer lighting instruments require more complex control systems than in the past. Consequently, additional documentation is necessary. Section 4 provides guidance on documenting these control systems.

4.1 Lighting Control Systems and Networking

In lighting control systems, multiple different data transmission technologies are used. In this RP the words "lighting control network" or just "network" are used as catch-all terms for these different technologies.

A network is formed when devices, called hosts, are connected to exchange information. Lighting consoles and other devices that send control commands and the lighting instruments and other equipment that receive those commands are host devices. For host devices to communicate they need to be connected with pathways they can send data across. The cables and other equipment used to create the pathways can be called infrastructure.

It is a common practice in networking, including lighting control networks to connect multiple smaller networks together to create a larger interconnected network. In lighting control systems, a separate network can often be identified in one of two ways:

1. When different infrastructure technology is used to connect host devices together. Examples include DMX cables, Ethernet cables, and wireless transceivers.
2. When networks are partitioned via software so that one or more host devices are not able to communicate with other host devices on the same physical network. Examples of this include the use of different subnet masks and IP address ranges in an IPv4 network and the use of Virtual Local Area Networks (VLANs) within the Ethernet switch.

It is important when designing and documenting networks to understand what parts of the lighting control system are on a different network.

4.2 Lighting Control System Documentation

This RP covers common lighting control network technologies currently in use but is not comprehensive. Users should consult manufacturer documentation and industry standards for additional information. For technologies not covered, use these recommendations as a model for creating documentation.

4.2.1 What to Document

Lighting control systems encompass all the devices connected via physical, wireless, or virtual means for controlling lighting equipment and transmitting data. This includes wired Ethernet, wireless networks, DMX512-A (ANSI E1.11) controlled equipment, and other equipment using show control technologies like MIDI or SMPTE ST:12-1 Timecode. The following list includes several types of equipment that may be included in system documentation when they are connected to the lighting network but is not exhaustive.

Lighting Control Devices:

- Lighting Control Consoles
- Media Servers
- Computers
- Architectural Lighting Controllers
- Architectural Lighting Control Stations

Controlled Lighting Equipment:

- Lighting Instruments and effects equipment that require a control signal to operate

Power and Control Network Infrastructure Devices:

- Dimmer Racks
- Relay Panels
- LED Drivers
- Lighting Control Equipment Racks
- Lighting Control DIN Enclosures
- Network Switches

- Network Routers
- Network Hubs
- Patch Panels
- Wireless Access Points
- DMX Gateways or Nodes
- DMX Splitters or Repeaters
- Wireless DMX Transmitters and Receivers
- Ethernet Receptacle Plates or Jacks
- DMX Receptacle Plates

DMX, Ethernet, Fiber Optic, and any other cable types used to connect devices on the lighting network may be included on control system diagrams and some other document types but are not typically included on lighting device plans.

The information that needs to be documented for the devices listed above depends on the lighting control network technology used by the device and the purpose the device serves. See a list of information that may need to be documented for different devices in Section 4.5 Device Schedules.

4.2.2 Lighting Control System Documentation Software

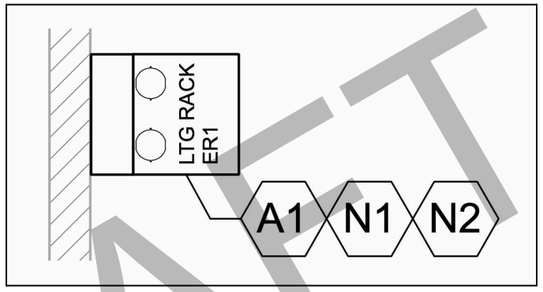
When choosing software for creating lighting control network documentation, ensure that the symbols used to represent lighting network equipment and the Device IDs are consistent throughout all show documentation. This is particularly important when different departments use the same network. If consistency is not possible, coordination is essential to avoid control network conflicts.

4.3 Lighting Device Plans

Lighting Device Plan (DP) drawings are similar to light plot drawings but are used to show specific locations for lighting control system equipment and do not include the lighting instruments and effects equipment included on the light plot. They are drawn in scale and show a ground plan view of the performance venue. They may be included as part of a stand-alone lighting system document package, to present information specifically focused on lighting network equipment locations, or when lighting control system equipment is located in performance venue areas that are not shown on a light plot.

4.3.1 Device Plan Drafting Recommendations

- DP drawings should be drawn over a background layer with enough venue architecture to identify lighting control device locations.
- Include room names and numbers.
- Use scaled symbols that include Device IDs for lighting control equipment. Other information fields may be included if desired.
- Position symbols as close as possible to actual device locations and include dimensions if exact placement is necessary.
- All Lighting Control and Power and Control Network Infrastructure devices listed in Section 4.2.1 may be included on DPs, but Controlled Lighting Equipment are typically shown on light plots and not DPs.
- For network devices located in an equipment rack, draw a rack symbol and connect Device IDs for each device to the rack symbol with leader lines.



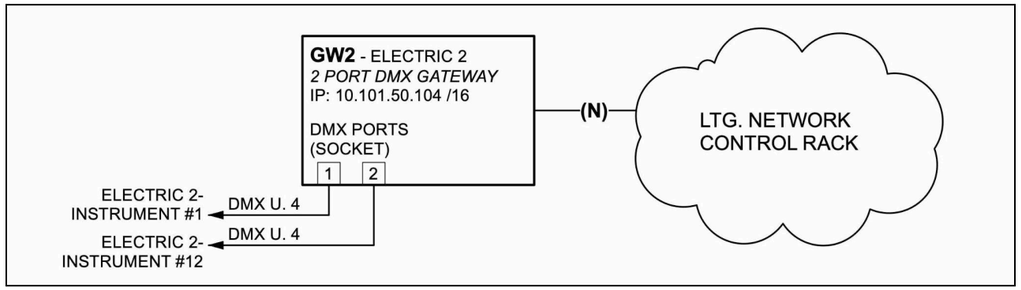
(Figure 4.3.1.0.1: Device location call out sample)

4.4 Lighting Control System Diagrams

Lighting control system diagrams or just system diagrams (SD) are used to show lighting devices that are connected to the lighting control network and the cables and other pathways between devices on the network. Unlike lighting device plans, SDs are not drawn in scale or drawn over architectural backgrounds. SDs use symbols for equipment and lines to represent cables. "System Diagram" encompasses various types, including riser, functional, block, and interconnect diagrams. At least one SD should be included in the documentation, with the SD type(s) selected based on project needs or preferences.

For new installations, include all lighting network infrastructure and permanently installed devices on SDs. For new productions in existing venues the documenter may choose to include only the relevant network infrastructure and devices for that production. At minimum, documentation should cover all impacted devices, such as DMX gateways and any new controlled devices.

If a network segment is unknown or undefined, represent it as a cloud in the documentation. Known network parts should be drawn normally and connect to the cloud, which should be labeled to describe the unknown portion.

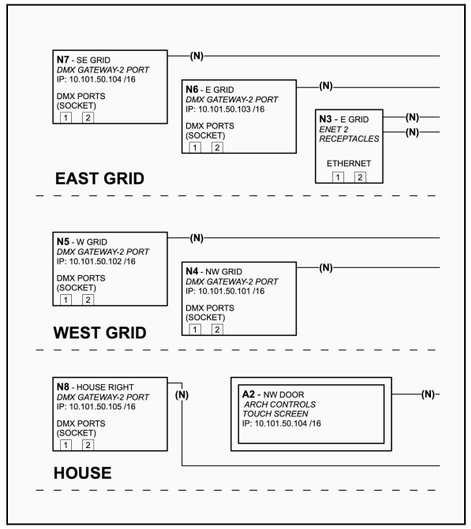


(Figure 4.4.0.1 – Unknown Network Portion)

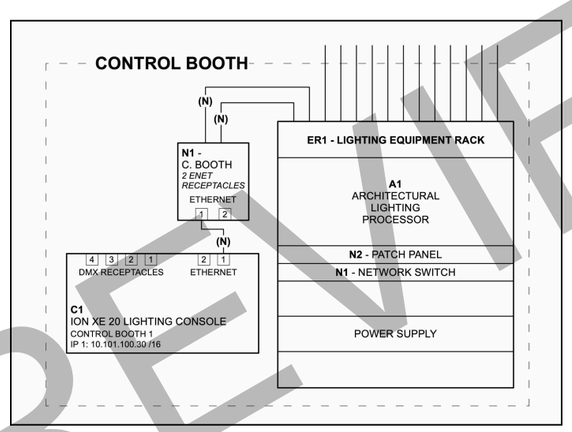
4.4.1 System Diagram Drafting Recommendations

- Do not include architecture or scenic backgrounds.
- Organize devices on SDs by general building locations, such as floors or venue areas (e.g., control booth, stage left, stage right).

- Arrange devices within each location together. Separate locations with thin dashed lines that divide areas with straight lines or enclose them in shapes.
- Label each location with a name. Include a room number if applicable.
- Cabling and all device types listed in Section 4.2.1 may be included on SDs.



(Figure 4.4.1.0.1 – Example of lighting network devices grouped by area on an SD.)



(Figure 4.4.1.0.2 – Example of lighting network devices located in the control booth on an SD.)

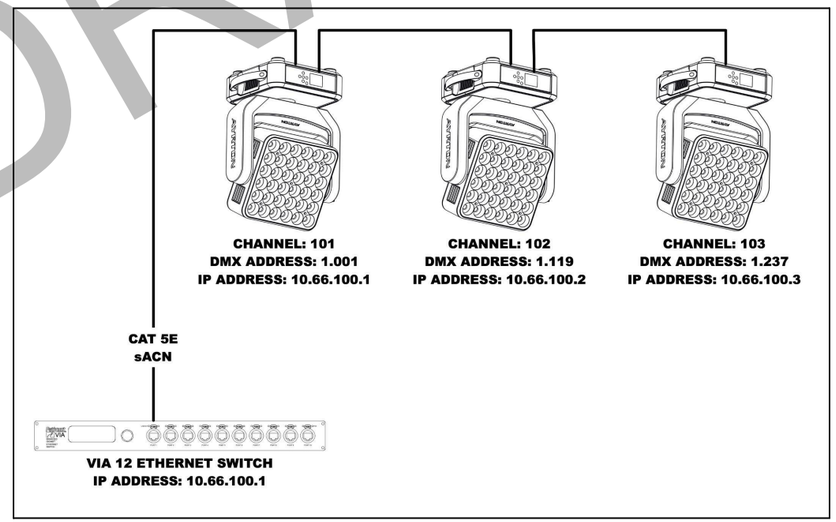
When a lighting control system is large or complex, the SD may be broken into multiple drawings. This can be done when the full lighting network will not fit on one drawing sheet or to focus on a specific part of the lighting control system. Logical breakpoints for dividing SDs include:

- Different rooms or different building floors
- Transition point from permanent to show-specific network segments
- Transition point from one networking technology to another (e.g., DMX512-A Ethernet)
- Transition point from lighting network to lighting instruments on the network.
- Transition from network cables run to a lighting control rack to an interconnect diagram showing cable connections to network equipment in the rack.

4.4.1.1 Lighting Instruments & SDs

When sufficient lighting control network information for lighting instruments is included on light plot drawings, they do not need to be included on SDs. If included on SDs, for clarity, lighting instruments may be included on a separate SD from the rest of the network. On an SD for lighting instruments include:

- The network infrastructure device linking the instruments to the network. If the rest of the network is not shown include a fly-off symbol and connection information.
- The lighting instruments connected to that network segment, arranged in connection order.
- All cable connections between instruments and to the network.
- A termination device at the end of a network run, if applicable.



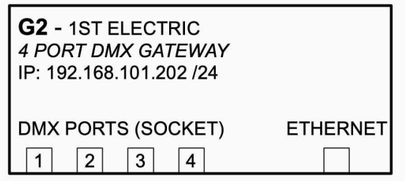
(Figure 4.4.1.1.0.1: Lighting fixtures shown on a system diagram) Graphic provided courtesy of PRG.

4.4.2 System Diagram Symbols

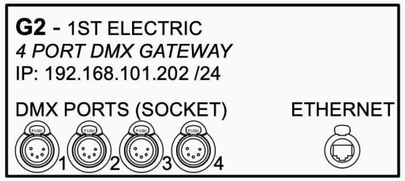
Lighting control network device symbols on SDs should show cable connections to input/output (I/O) ports. Follow Section 2.3.8 and these guidelines for creating symbols:

- Include port numbers and/or graphic representations of I/O ports when there is more than one port on a network device. (See figure 4.4.2.0.1)
- For devices with different I/O port types, include labels or different graphics for each type. (See figure 4.4.2.0.2)
- For devices with SFP or other types of I/O ports that can be configured in multiple ways using different hardware, include a local note that specifies the required hardware and resulting port configuration. (See figure 4.4.2.0.3)

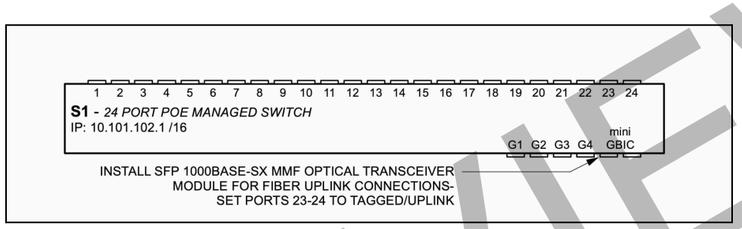
- Port numbers and/or labels on symbols should match those on the actual device. (4.4.2.0.4 in final publication)
- Symbols for patch panels should allow connections on both sides of an I/O port. (4.4.2.0.5)
- For devices with multiple I/O ports on both the front and back use a symbol that shows both a front and back view. (See figure 4.4.2.0.6)
- When a device has one or two I/O ports located on a different side from the rest of the I/O ports, the ports may be depicted on opposite edges of the symbol. (See figure 4.4.2.0.7)
- I/O ports may not need to be shown on device symbols when:
    - There is only one I/O port on a device. (See figure 4.4.2.0.8)
    - Cable connections are hardwired in a backbox.
    - Many network cables are routed to one location and a separate interconnect diagram or per port list is provided instead. (See figure 4.4.5.01.)



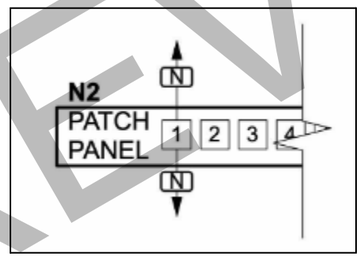
(Figure 4.4.2.0.1 –(A) I/O port representation.)



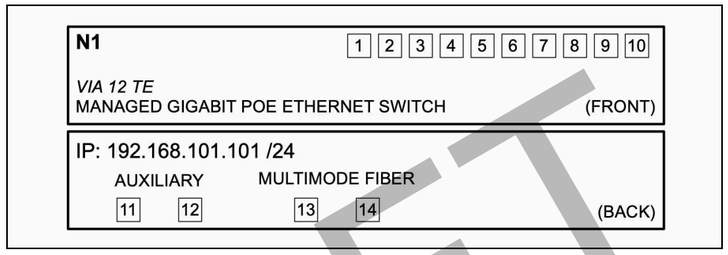
(Figure 4.4.2.0.2 – Different I/O port types.)



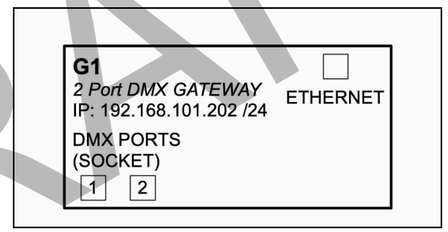
(Figure 4.4.2.0.3– SFP I/O port types.)



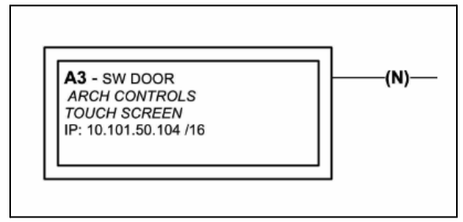
(Figure 4.4.2.0.5 – Patch Panel symbol with connections on both sides)



(Figure 4.4.2.0.6 – Image of device symbol that includes both a front and back view to show I/O ports on both the front and back of the device.)



(Figure 4.4.2.0.7 – Image of symbol showing front I/O ports on the bottom of the symbol and an I/O from the back of the device on the top of the symbol.)



(Figure 4.4.2.0.8 – only one I/O port on a device.)

4.4.2.1 System Diagram Information Fields

Each symbol on SDs must include:

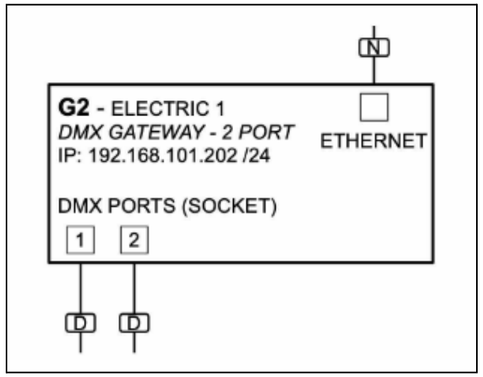
- Device ID
- Device manufacturer and model or a descriptive name (e.g., 2 Port DMX Gateway)
- Address details when applicable
    - DMX 512-A devices: Universe number, start address
    - IPv4 devices: IP address and subnet mask. For brevity, the Classless Inter-Domain Routing (CIDR) notation may be used in place of the subnet mask (e.g., /16 or /24).

Additional information fields may be included as needed. See Sections 4.4.7 and 4.5 for additional options.

4.4.3 System Diagram Cable Recommendations

All network cable connections between devices should be included on SDs. Follow these recommendations for showing cables:

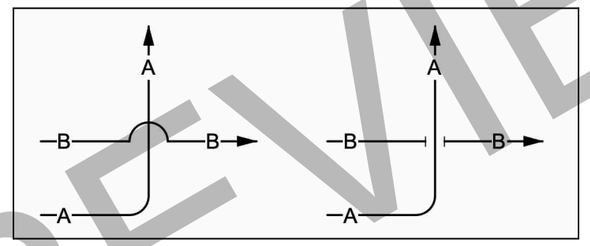
- Use lines to represent cable connections between network devices.
- Draw cable lines connecting at right angles to each device symbol's perimeter at the appropriate I/O ports or using consistent spacing when I/O ports are not included.
- Use a different line thickness and/or line types for cable lines, typically thinner than the lines used for device symbols.
- Rounded corners can further distinguish cable lines from symbol lines.



(Figure 4.4.3.0.1 – visual of different line weights)

4.4.3.1 Crossing Cable Lines

Avoid crossing cable lines; if unavoidable, cross at right angles. Use a semi-circle "jumping-over" or break line to clarify that crossing cables do not make contact.



(Figure 4.4.3.0.1 – Example of two methods used to show two cables crossing on NSDs.)

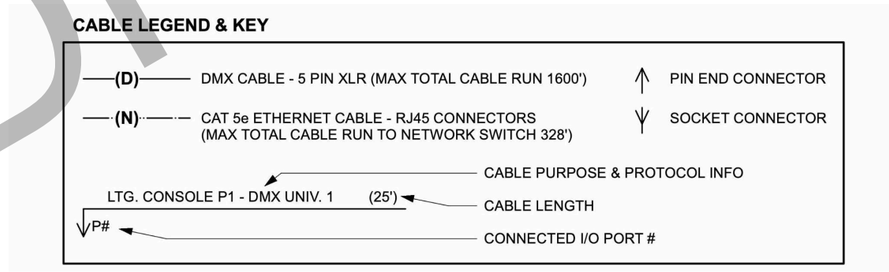
4.4.3.2 Cable Labels & Information Fields

Identify each cable type using labels and/or different line types. Color may also be used in addition to labels and different line types but should not be used instead of them. Include an example of each cable type with a definition in the legend. Additional information about cables can be included as information fields next to the line or in the legend.(See figure 4.4.3.2.1) The following information may be included:

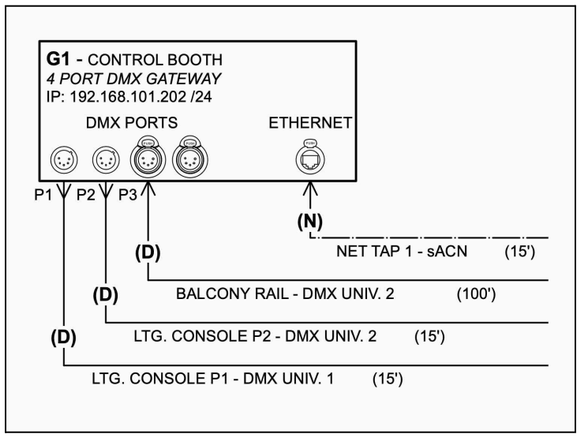
- Cable ID number
- Cable connector type
- Cable length
- Special purpose (e.g., "backup" or "trunk line")
- VLAN, DMX Universe, Protocol type, or other information about the data traveling on a cable.
- Cable specification information or limitations
- Source or destination information
- Connected I/O port number (If the device symbol's I/O ports lack clear port numbers.).

Follow these recommendations for cable information field placement.

- Place cable information fields consistently for clarity.
- Locate I/O port connection numbers and connector type labels near connection points.
- Locate cable type and/or length labels spaced apart from connector labels. (See 4.4.3.2.2).
- Position information fields adjacent to or within the cable line they refer to.
- Cable type labels may be enclosed in a simple container shape to add emphasis.



(Figure 4.4.3.2.1 - Label legend and key showing location and meaning for cable labels and information fields)



(Figure 4.4.3.2.2 - Examples of cables with labels and information fields on SD drawings)

4.4.3.3 Cable Lengths

- Include the maximum cable length from networking standards in the drawing legend or notes (See figure 4.4.3.2.1).
- Specify the actual cable length for each installed network cable on the SDs when possible.

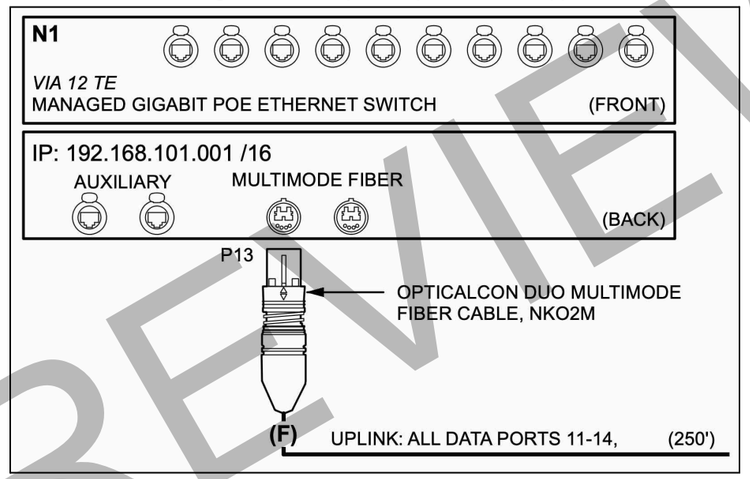
4.4.3.4 Cable Connector Type

Document the termination method or connector type at the ends of each cable.

- Include connector information in the cable type definition in the label legend (See figure 4.4.3.2.1).
- When the same type of cable is terminated with different connectors, create a different cable type on SDs for each variation, or add a note indicating the connector variation.

Follow these recommendations when identifying connector types on the ends of cables or I/O ports mounted on devices, panels, or face plates.

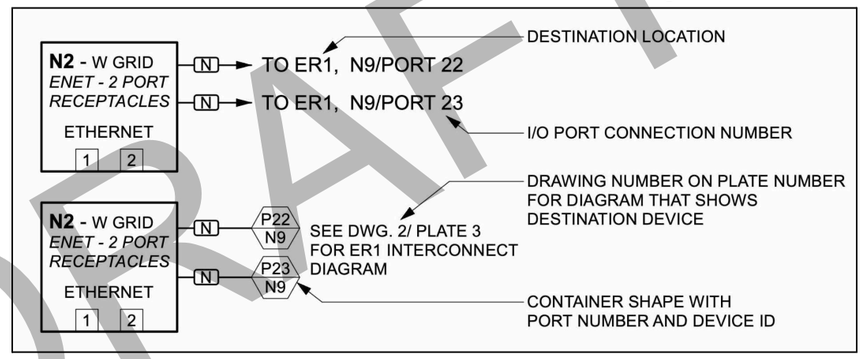
- Use “plug” or “pin end” for connectors with pins, and “socket” for connectors with holes (See figure 4.4.3.2.1).
- Use “receptacle” or “jack” for mounted cable connection points. “Socket” may also be used when connectors with holes are mounted.
- Arrows may be used to show connector types: towards the device for pin ends, and away for sockets (See figure 4.4.3.2.2).
- Graphic representations of connectors may also be used. (See figure 4.4.3.4.1)
- Include the manufacturer’s designation for specialty connector types.



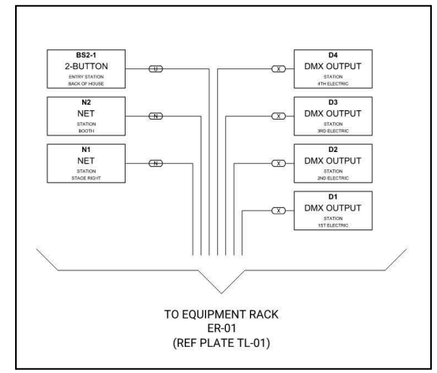
(Figure 4.4.3.4.1 - Example of connector with note listing manufacturer’s part number for cable type)

When system diagrams span multiple drawings, use a "fly-off" symbol or perpendicular line to break cable lines at the division point.

- For a single cable, show the break with an arrow, short perpendicular line, or container shape enclosing cable destination device info. Include a note with the cable’s destination device ID, device name, connection I/O port number, and the drawing sheet and drawing number when applicable for the next part of the SD. At the cable destination device, include a fly-off symbol and the same note information for the cable’s origin device. (See figure 4.4.3.5.0.1)
- For multiple cables with the same destination location span between two SDs break the cables at a long line and include a note with information on the cable’s destination device and where to find the SD that shows the cable’s destination device. This method is often used for lighting networks that include one or more equipment racks with patch panel(s) and network switch(es) that multiple lighting network devices are connected to. (See figure 4.4.3.5.0.2 and related sections on Port List and Interconnect Diagram)



(Figure 4.4.3.5.0.1 – Example of fly-off symbol used to show where to find the other end of the cable.)



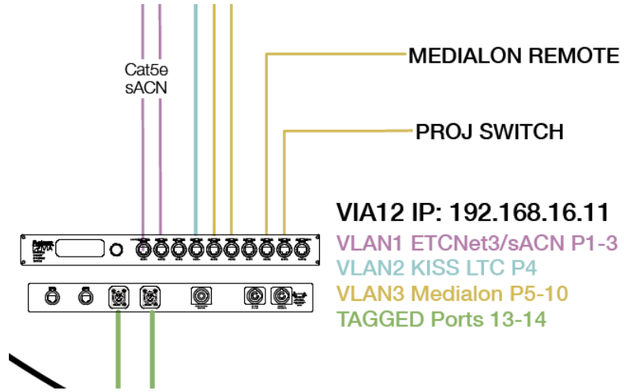
(Figure 4.4.3.5.0.2 – Example large break line showing that many cables are routed to the Equipment Rack.)
Graphic provided courtesy of Barbizon Lighting Company

4.4.4 VLANs, LAGs, and Uplink Ports

When Ethernet switches are set up to create VLANs, LAGs, Uplink Ports, or other specialty cable path configurations on one or more ports it is critical to document those ports and the cables connected to them on SDs.

- Label the Ethernet port(s) on the network switch with the VLAN, LAG, or Uplink Port they are assigned to. The ports may also be highlighted with different color overlays.

- Label any cables and other devices that are connected to those Ethernet ports with the appropriate VLAN, LAG, or Uplink Port. This can be done with labels, different line weights or line types, and/or color may be used in addition to labels.

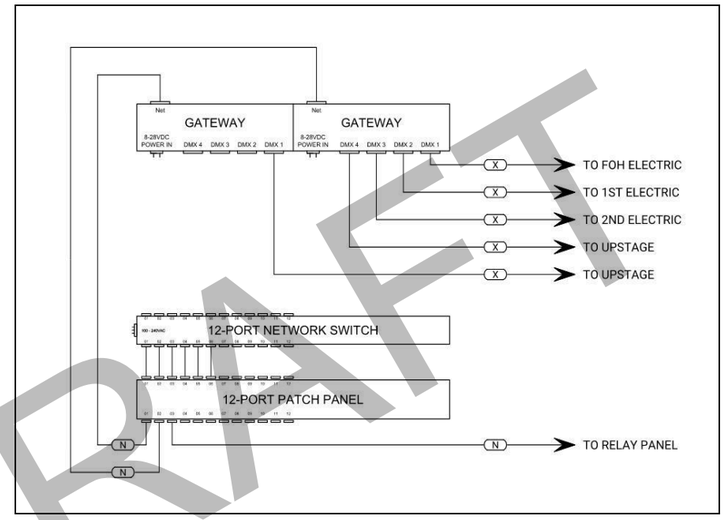


(Figure 4.4.4.0.1: Labeling ethernet ports with the VLAN they are assigned to. Color is also used to show the different VLAN port assignments and the cables are drawn with colored lines that match the color of the VLAN they are connected to.)
Graphic permission pending from PRG

4.4.5 Interconnect System Diagrams

An interconnect system diagram can be used to document a section of a lighting control network that includes a lot of cable connections in one location (e.g., network rack). To create an Interconnect SD:

- Include a symbol for each network device located in a network rack.
- Draw all cable connections to I/O ports.
- For cables extending outside the rack use a fly-off symbol with the device ID where the cable connects.



(Figure 4.4.5.0.1 – A portion of an Intraconnet type of NSD showing network equipment in a rack and the cable path. Landing location notated outside of the equipment rack.) Graphic provided courtesy of Barbizon Lighting Company.

4.4.6 Port Lists or Patch Panel Schedule

Another method for documenting devices with several I/O port connections is to create a Port List or Patch Panel Schedule. Use a Port List for Ethernet Switch I/O ports and a Patch Panel Schedule for patch panel connections. Either document may be used in addition to or instead of drawing device connections on an SD. See Section 4.5 for information fields that may be included.

- Create one list or schedule for each device.
- Include each port number sequentially in the first column.
- Add additional columns for each desired information field.
- When a port list is included with SDs draw a cable line with a fly off from each device symbol with a note on what device represented by a port list the cable is connected to.

Lists or schedules may be placed on the same drawing sheet as the system diagram or may be included on sheets with detail drawings and schedules.

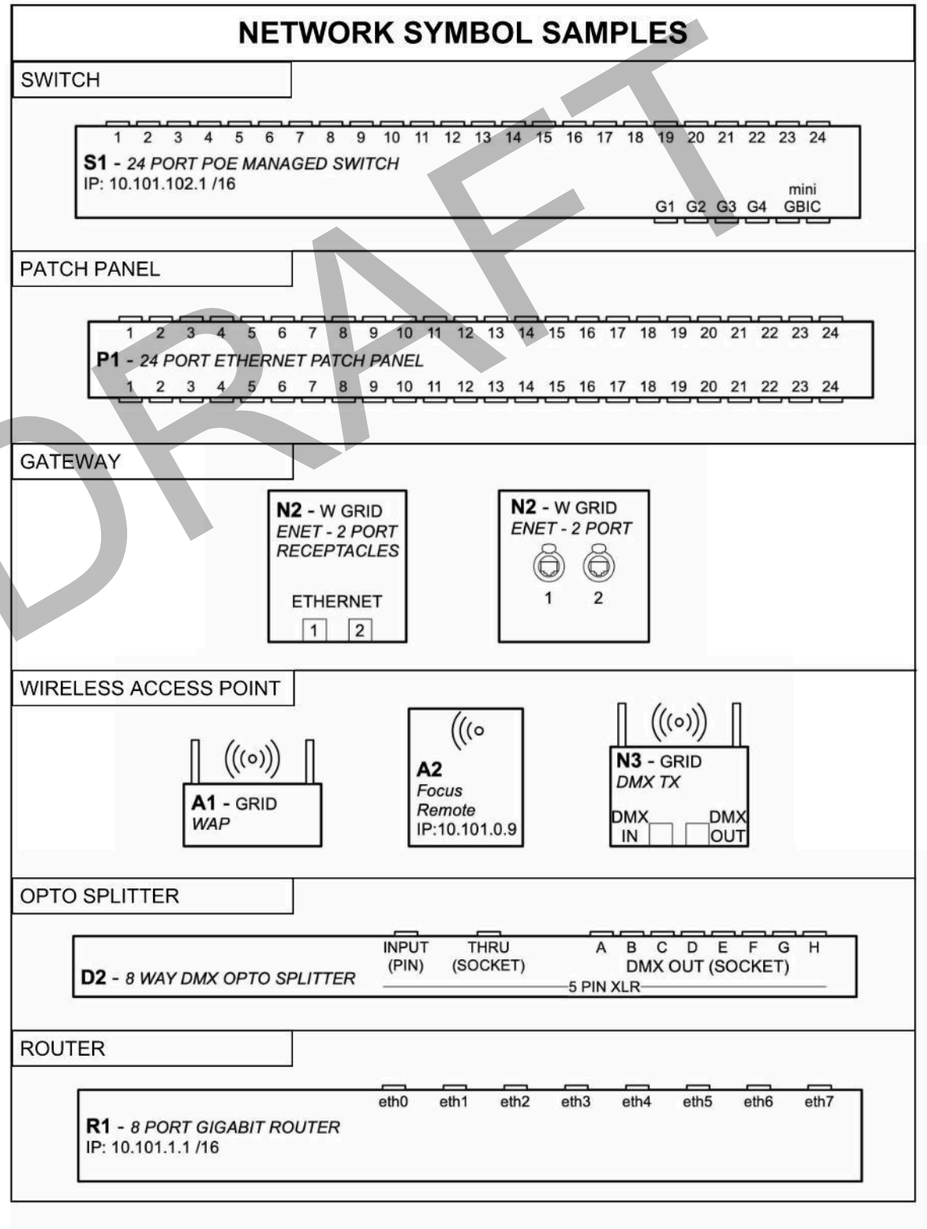
FOH Switch Ports

Port	Device	VLAN	
1	MA2 Full	50	Manet
2	MA2 Full	52	Artnet
3	Control room patch	50	Manet
4	FOH Patch	52	Artnet
5	NPU	50	Manet
6	tech comp	12	house
7	tech comp	50	Manet
8		12	house
9	Stage Patch	52	Artnet
10	MBOX LT	50	Manet
11		12	house
12		52	Artnet
13	MBOX RT	50	Manet
14	FOH Patch	50	Manet
15	Video Router	12	house
16	Barco DX	50	Manet
17		50	Manet
18	Paradigm	51	sACN
19		51	sACN
20		51	sACN
21		52	Artnet
22		50	Manet
23		51	sACN
24		52	Artnet

VLAN	IP	Purpose
12	10.90.93.x	house
50	192.168.0.x	Manet
51	10.x.x.x	sACN
52	2.x.x.x	Artnet
san	192.168.10.x	SAN

(Figure 4.4.6.0.1 – Example of Port List.)

4.4.7 System Diagram Symbol Examples



(Figure 4.4.7.0.1: Samples of symbols for network devices.)

4.5 Device, Power, and, Control Schedules

Include one or more device schedules with lighting control system diagrams to provide detailed information on network devices, similar to the instrument schedule for a light plot.

Use a single device schedule for smaller systems or multiple schedules for larger, complex systems. Device schedules that focus on a particular type of equipment or method of sorting equipment should be named to identify the specific purpose for the schedule.

At a minimum a device schedule should include columns for the Device ID, and the device manufacturer (make) and model or a descriptive device type name (e.g., 2-Port DMX Gateway).

Additional information columns should be included based on the type of device schedule and project documentation needs. The following sections include the most common types of device schedules and a list of additional information that may be included on schedules for different types of equipment.

4.5.1 General Device Schedule

A general device schedule provides a complete list of lighting network devices. The schedule is organized by Device IDs listed in the first column. The most common additional information column is for device location, but other information columns are often included based on project needs.

4.5.2 IP Address Schedule

An IP address schedule includes equipment that uses the IPv4 or IPv6 protocols. Additional information columns include IP address plus other information columns based on the protocol used.

(Figure 4.5.2.0.1: Samples to come in final publication.)

4.5.3 Lighting Device Schedules

If more information is needed on lighting instruments than can be fit on an instrument schedule and channel hookup a lighting device schedule may be included. The following additional information organized by the type of lighting control technology used may be included:

E1.31 Streaming ACN (sACN)
Universe List
- Universe
  - Number
  - Purpose
  - Sync Details
  - VLAN if applicable
  - Priority

Art-Net
ArtNet Version (1, 2, 3, or 4)
Subnet
- Universe
  - Number
  - Purpose
  - VLAN if applicable

E1.11 DMX512-A
Universe
- Number
- Purpose
- Operating mode or personality with required number of DMX slots in parenthesis
- Fixture start address
- Lighting console control channel assignment

(Figure 4.5.3.0.1: Samples to come in final publication)

4.5.4 Patch Panel Schedule

Physical connection of network cable runs are typically accomplished through the use of patch panels. A patch panel schedule should be created for each patch panel in the lighting control system. Each patch panel should be assigned a device ID and may be given a name. Patch panel schedules document the required patch connections and may include the following additional information columns:

- Source Port
- Destination Port
- Connected Device
- Cable Labels

(Figure 4.5.4.0.1: Samples to come in final publication)

4.5.5 Additional Information Columns Based on Equipment Type

The following list of information for different types of lighting equipment may be included on device schedules and/or included as information fields on lighting documentation drawings:

4.5.5.1 General Information for All Device Types

- Device ID
- Device type or descriptive device name
- Make and Model
- Serial Number
- Location

4.5.5.2 Devices Using IPv4 or IPv6 Technology

- Host name
- Runs IPv4 or IPv6

- IPv4
  - Config type
  - DHCP
  - Static
  - Auto-Config
  - IP Address
  - Subnet Mask
  - Gateway
  - MAC Address
- IPv6
  - IPv6 Prefix
  - IPv6 Router(s)
  - Config type
  - DHCPv6
  - SLAC
  - Static
  - MAC Address

4.5.5.3 Wired Ethernet Network Infrastructure

- Routers
  - Interfaces
    - IP Address Info
    - Routing information
    - DHCP Server information
  - Protocol filtering
    - Protocol based VLANs
    - Protocol / IP port routing between VLANs
- Switches
  - Ports
    - Connected Devices
    - VLANs
    - LAG Ports
      - Uplink Ports
      - RSTP
        - Off/on
      - EAPS
        - off/on
        - Master or Transit
      - Fiber
        - Single or Multimode
        - Connector type
        - Transceiver information
      - Copper
        - Min. cable category requirement
        - Max. cable length
      - Speed (100mbit/s, 1000mbit/s, auto, etc.)

4.5.5.4 Wi-Fi Network Infrastructure

- Wireless Access Points
  - AP mode (bridge, router, etc.)
  - Frequency
  - Channel
  - Wi-Fi SSID
  - Passwords
  - DHCP range
  - Access Control List setup

- Wireless devices
  - Purpose/Name
  - IP address
  - MAC address

4.5.5.5 Wireless DMX Infrastructure

Wireless DMX

- Transmitter or Receiver
  - Universe
  - Frequency
  - Antenna information (when applicable)
  - Other settings based on equipment make and model

4.5.6 Panel Schedules

A panel schedule illustrates the power distribution from a device (such as a relay panel or dimmer rack) across a space to distribution receptacles (such as outlet boxes or connector strip raceways).

LOCATION DIMMER ROOM
MOUNTING SURFACE

RP-1

120/208 VOLTAGE
3-PH, 4W WIRE
22,000 A.I.C.

	kVA						100A MAIN BREAKER					kVA			
TYPE	A	B	C	DIRECTORY	BKR	CKT	A | B | C	CKT	BKR	DIRECTORY	A	B	C	TYPE
M	-	-	-	FOH	20/1	1	A | |	2	20/1	FOH	-	-	-	M
M	-	-	-	FOH	20/1	3	| B |	4	20/1	FOH	-	-	-	M
M	-	-	-	1ST ELECTRIC	20/1	5	| | C	6	20/1	1ST ELECTRIC	-	-	-	M
M	-	-	-	1ST ELECTRIC	20/1	7	A | |	8	20/1	1ST ELECTRIC	-	-	-	M
M	-	-	-	2ND ELECTRIC	20/1	9	| B |	10	20/1	2ND ELECTRIC	-	-	-	M
M	-	-	-	2ND ELECTRIC	20/1	11	| | C	12	20/1	2ND ELECTRIC	-	-	-	M
M	-	-	-	3RD ELECTRIC	20/1	13	A | |	14	20/1	3RD ELECTRIC	-	-	-	M
M	-	-	-	3RD ELECTRIC	20/1	15	| B |	16	20/1	3RD ELECTRIC	-	-	-	M
M	-	-	-	STAGE RIGHT	20/1	17	| | C	18	20/1	STAGE RIGHT	-	-	-	M
M	-	-	-	STAGE LEFT	20/1	19	A | |	20	20/1	STAGE LEFT	-	-	-	M
M	-	-	-	SPARE	20/1	21	| B |	22	20/1	SPARE	-	-	-	M
M	-	-	-	SPARE	20/1	23	| | C	24	20/1	SPARE	-	-	-	M
	0	0	0								0	0	0	

PHASE A	0	kVA
PHASE B	0	kVA
PHASE C	0	kVA
TOTAL	**0**	**kVA**

M=MOTORIZED BREAKER
Z=ZONE CONTROL
S=SEQUENCED
D=DMX CONTROL
I=ISOLATED GROUND CIRCUIT

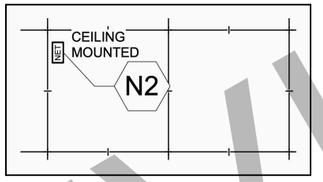
(Figure 4.5.6.0.1: Panel Schedule Sample)

4.6 Lighting Control System Documentation Combined with Lighting Design Documents

In smaller or less complex lighting control systems it may be possible to add lighting control system documentation to the light plot, lighting section, instrument schedule and channel hookup. Follow the recommendations in Section 4.3 along with these recommendations when taking that approach.

4.6.1 Adding Lighting Control System Information to a Light Plot and Section

- Include lighting control network equipment (e.g., network receptacles, DMX gateways, splitters, switches) on the light plot if it is located on or adjacent to lighting positions and provides control signals to lighting instruments.
- If equipment is near a lighting position but not mounted on the pipe, show it on the light plot with a device ID and a note on its mounting location (e.g., "Wall Mounted", In Raceway, Above Electric", or similar.) (See figure 4.6.1.0.1)
- Use a "fly-off" symbol with device ID and location to indicate remotely located network devices providing control signals to lighting instruments.
- Network infrastructure devices mounted on lighting pipes should be identified by device ID. They don't need instrument numbers and should not be listed on the instrument schedule.
- Lighting control system documents may be included on the same drawing sheet as the light plot if there is room.
- Include network infrastructure devices on lighting section drawings if it aids in equipment location or coordination.



(Figure 4.6.1.0.1 – Notation of different non-pipe mounted device)

4.6.2 Adding Lighting Control System Information to an Instrument Schedule and Channel Hookup

A limited amount of lighting instrument specific network information (e.g. automated lighting instrument operation mode, DMX slot footprint) may be included on instrument schedule and channel hookup documents by adding it to the fixture name or including an extra column in the schedules.

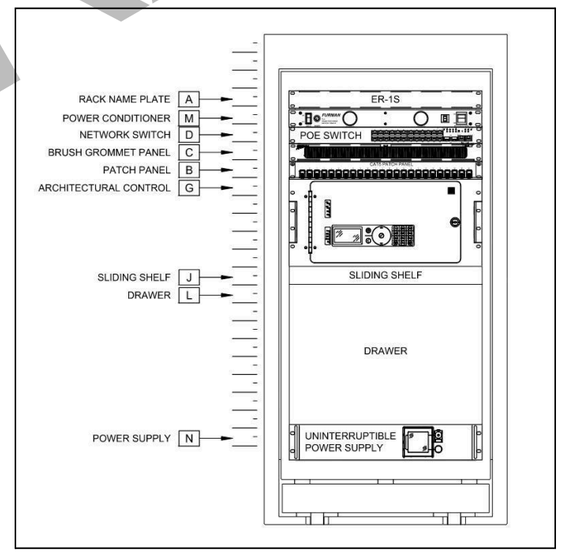
4.7 Detail Drawings

Detail drawings provide close up views, typically drawn in scale, of lighting devices that can be used to specify or build custom assemblies or show special installation conditions. They should be included with lighting documentation when needed.

4.7.1 Rack Elevation Detail Drawings

Include a Rack Elevation Detail Drawing with lighting documentation when specifying a new network equipment rack or when making changes to an existing rack (See figure 4.7.1.0.1)

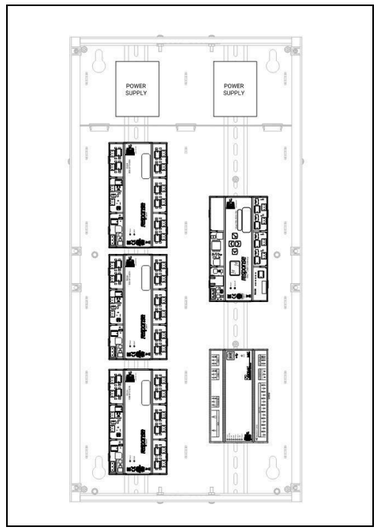
- Show the rack with installed equipment and rack unit (RU) numbering that matches the actual rack. When the actual rack does not include RU numbers start with 1 at the top.
- Represent network equipment with rectangles that match the RU size of the actual device, or with an elevation view of the device.
- Place labels inside the device rectangle or aligned with the device on one side of the rack.
- Always include the device ID. The device type, device name, make and model, or other information fields may also be included.
- Include the rack name, number, and the room name and number. Number multiple racks in a room from left to right when facing the front.



(Figure 4.7.1.0.1 – Rack elevation drawings with unit labels)
Graphic provided courtesy of Barbizon Lighting Company

4.7.2 DIN Enclosure Drawings

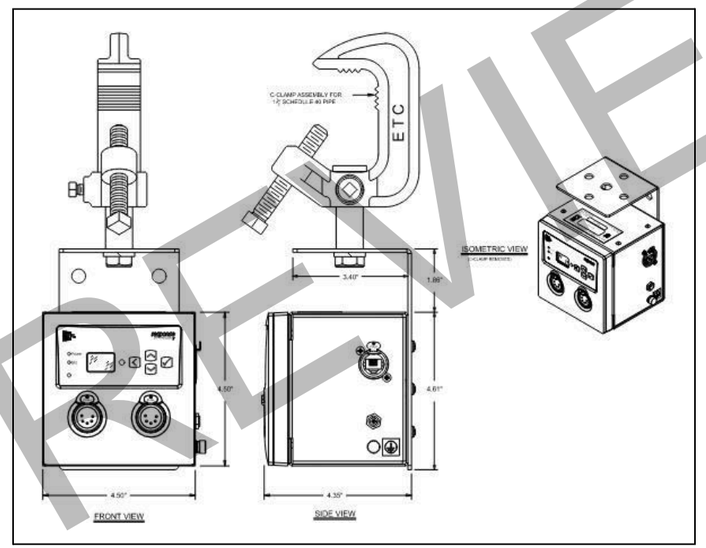
A DIN enclosure is another way to mount some lighting control devices. When a DIN enclosure will be used in a lighting control system, a detail drawing showing the enclosure and equipment installed in it should be included with lighting documentation.



(Figure 4.7.2.0.1 – DIN elevation drawings with unit labels)
Graphic provided courtesy of Barbizon Lighting Company and ETC

4.7.3 Device Details Drawings

Providing a detail view of the physical attributes or the mounting position for certain devices can enhance communication regarding their implementation and functionality. (See figure 4.9.0.1)



(Figure 4.8.0.1: Device detail to show mounting method and dimensions for a device)
Graphic provided courtesy of ETC

4.8 Device Configuration Files

Some lighting network devices can store settings and information about connected devices in configurations files. These files are manufacturer-specific and come in different formats. It is an important part of network documentation to keep copies of all relevant configurations. These copies may be stored and included with network documentation in whatever way is most effective for each device's configuration file format. Creating a list or table of each network device and the current configuration file can make keeping track of current configuration files easier.

Full package Samples to come in final publication:

- Title / Cover Page
- Light Plot
- Lighting Section
- Lighting Elevation
- Set Electrics with LED tape detail
- Boom plate
- Focus point layout
- Hookup schedules
- Lighting Control Plan
- Intraconnect System Diagram
- Rack Elevation Detail
- DIN Enclosure Detail
- Port List
- Patch Panel Schedule
- IP Network Device Schedule
- IP Address Schedule
- Lighting Device Schedule
- Device Details
- Shop order

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Notes for this Doc NOT TO BE PUBLISHED

- **1 = 0 indent = Title Text Style**
- **1.1 = 0 indent = Header 1 Text Style**
- **1.1.1 = 0.25 indent = Header 2 Text Style**
- ***1.1.1.1 = 0.5 Indent = Header 3 Text Style***
- Normal Text is League Spartan
- Header text is Montserrat
- Single line spacing between every header and normal text
- ***INSERT FIGURE HERE***
  - *(Figure 4.4.7.3 – Example of Patch Panel)*