



Pre-Installation Manual

A-2 CPO Pinsetters
with Brunswick Bowling Equipment

March 2006 / B-0306-14

Brunswick® 

CUSTOMER SERVICE

A tradition in excellence.

A-2 CPO Pinsetters With Brunswick Bowling Equipment Pre-Installation Manual

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Notice: If available, updates to this manual can be found on-line at www.brunswickbowling.com.

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Table of Contents

Introduction	4
Notes and Comments	5
Power Requirements and Receptacle Locations	6
Pinsetter Power Outlet	7
Location	7
Power Supply	7
Customer Responsibility	7
Brunswick Responsibility	7
Ball Lift Control Box Power Outlet Information	8
Tele-E-Foul Power Outlet Information	9
Ballworx Ball Polisher Outlet Information	10
Lightworx Power Outlet Information	11
Automated Bumper System - All Scoring Systems	12
Ball Booster Power Outlets	13
Location	13
Power Supply	13
Customer Responsibility	13
Brunswick Responsibility	13
Raceway with Pull Wire	13
Location	13
Customer Responsibility	13
Brunswick Responsibility	13
Utility Grounded Outlets	14
Location	14
Power Supply	14
Customer Responsibility	14
Brunswick Responsibility	14
Junction Box	15
Location	15
Customer Responsibility	15
Brunswick Responsibility	15
Bowling Lane Lighting Suggestions	19

Introduction









This brochure was compiled to assist the customer with their preparation for electrical power, receptacles, outlets and connections to accommodate the various pieces of Brunswick's bowling equipment. In some instances, it suggests a means of arriving at these locations. It should be noted, however, that these are merely suggestions.

ACTUAL SYSTEMS AND METHODS USED ARE THE COMPLETE RESPONSIBILITY OF THE CUSTOMER AND HIS ELECTRICIAN , AND MUST BE ACCEPTABLE BY LOCAL CODES.

Notes and Comments

1. All wiring for 115-230 Volts must be furnished and installed by the customer. All single phase equipment (specified for either 115V or 230V) is designated for operation on a minimum sustained voltage of either 110V or 220V. For A-2 pinsetters, nominal voltages of 115, 208 and 230 are designed for operation of minimum sustained voltages of 95, 175 and 190 respectively.
2. If local codes require conduit, raceways, wireways or other devices for wiring to, from, or between Brunswick equipment, the installation and material costs of these devices must be considered when designing your bowling center.

Power Requirements and Receptacle Locations

SYMBOL & ITEM	VOLTS	HERTZ	AC OR DC	H.P. MOTOR	MOTOR TYPE (CAPACITOR OR OTHER)	PHASE	OPERATING CURRENT (AMPS)	UNITS PER FUSED CIRCUIT	CIRCUIT BREAKER SIZE	WATTS	CONNECTORS		SPECIAL NOTES	SUB PANEL
											MALE	FEMALE		
Ball Lift Control Box 	120 208 230	50/60	AC	1/4	Cap	1	6 @ 120 4 @ 208 or 230	2	15A	—	—	—	3 Wire, Grounded	Yes
Tet-E-Foul Unit (2 Lanes) 	120 230	50/60	AC	—	—	1	1	4	20A	30	—	—	3 Wire, Grounded	Yes
Lane Machine 	120	50/60	AC	2 @ 1/3 1 @ 1/8 1 @ N	2 Cap 2 Other	1	9	—	20A	—	—	—	Standard, 3 Prong Grounded Outlet	No
Ballworx Ball Polisher 	208 230	50/60	AC	1	Cap	1	20 (30 Surge)	1	30A	—	—	—	3 Wire Grounded Outlet	No
Lightworx 	120 230	50/60	AC	—	—	1	1	4	20A	—	—	—	3 Wire, Grounded	Yes
Pinball Wizard 	120 230	50/60	AC	1/10	Cap	1	3 @ 120 4 @ 230 per Pair	4	20A	—	—	—	2 Wires + Isolated Ground	Yes
A-2 Pinsetter 	230 208	60	AC	1	Cap	1	10	1	25A	—	—	—	I.G. 7313 Hubble Receptacle	
BALL BOOSTER 	230 208	60	AC	1/4	Cap	1	5	4	25A	—	—	—	I.G. 7484 Hubble Receptacle	
	115	60	AC	1/4	Cap	1	10	2	25A	—	—	—	I.G. 7484 Hubble Receptacle	

⊗ Pinsetter Power Outlet

Location

Ceiling mounted box with drop cord. Reference *Figures 1 & 6*.

Power Supply

Pinsetters will be supplied to operate on one of the following voltages, as determined by your utility company. All motors require 60 cycle, 1 phase supplies.

VOLTAGE	OPERATING CURRENT	WIRE SIZE	SIZE OF BREAKER
230 V	10 Amps	12 A.W.G.	15 Ampere
208 V	10 Amps	12 A.W.G.	15 Ampere
115 V	20 Amps	12 A.W.G.	25 Ampere

Special care is necessary to balance load on 3 phase supplies. The wire and circuit breaker supplies are based on the use of a separate circuit for each pinsetter. If two pinsetter are connected on a single circuit, these sizes must be increased proportionately.

Customer Responsibility

To supply all necessary feeder wiring up to and including the ceiling mounted junction box, with a flexible drop cord (rubber sheathed, 3 conductor, 12 gauge, type "S" service cord, or conduit, per local code) extending down from this box to within 5'2" (157.48 cm) above the playing surface of the lane. Brunswick will supply the connector to be installed (at the end of the drop cord) by the customer.

Brunswick Responsibility

To supply connector for the end of the drop cord. (Hubbell #7313)

Ball Lift Control Box Power Outlet Information **BL**

Power Requirements - Ball Lift Control Box

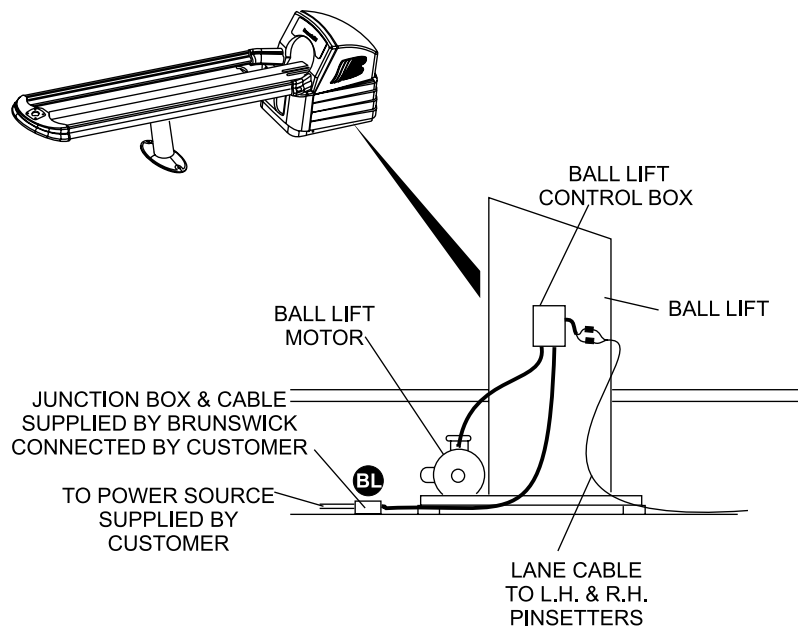
VOLTS	HERTZ	AC/DC	PHASE	H.P. MOTOR	AMP	WATTS	CIRCUIT REQUIREMENT	CUSTOMER RESPONSIBILITY	BRUNSWICK RESPONSIBILITY
120 208 230	50/60	AC	1	1/4	6A @ 120 4A @ 208 or 230	–	Insulated Ground	To supply feeder wiring and "J" box. Customer/Electrician to connect.	Supply flexible power wiring with male plug, junction box & cable.

Circuit Requirements - Ball Lift Control Box

WIRES PER CIRCUIT	UNITS PER CIRCUIT	WIRE SIZE	BREAKER SIZE	RECEPTACLE SUPPLIED BY CUSTOMER
3	2	12 Gauge	15 A	No

Outlet Location - Ball Lift Control Box

One junction box under the approach at each ball return.



Tel-E-Foul Power Outlet Information

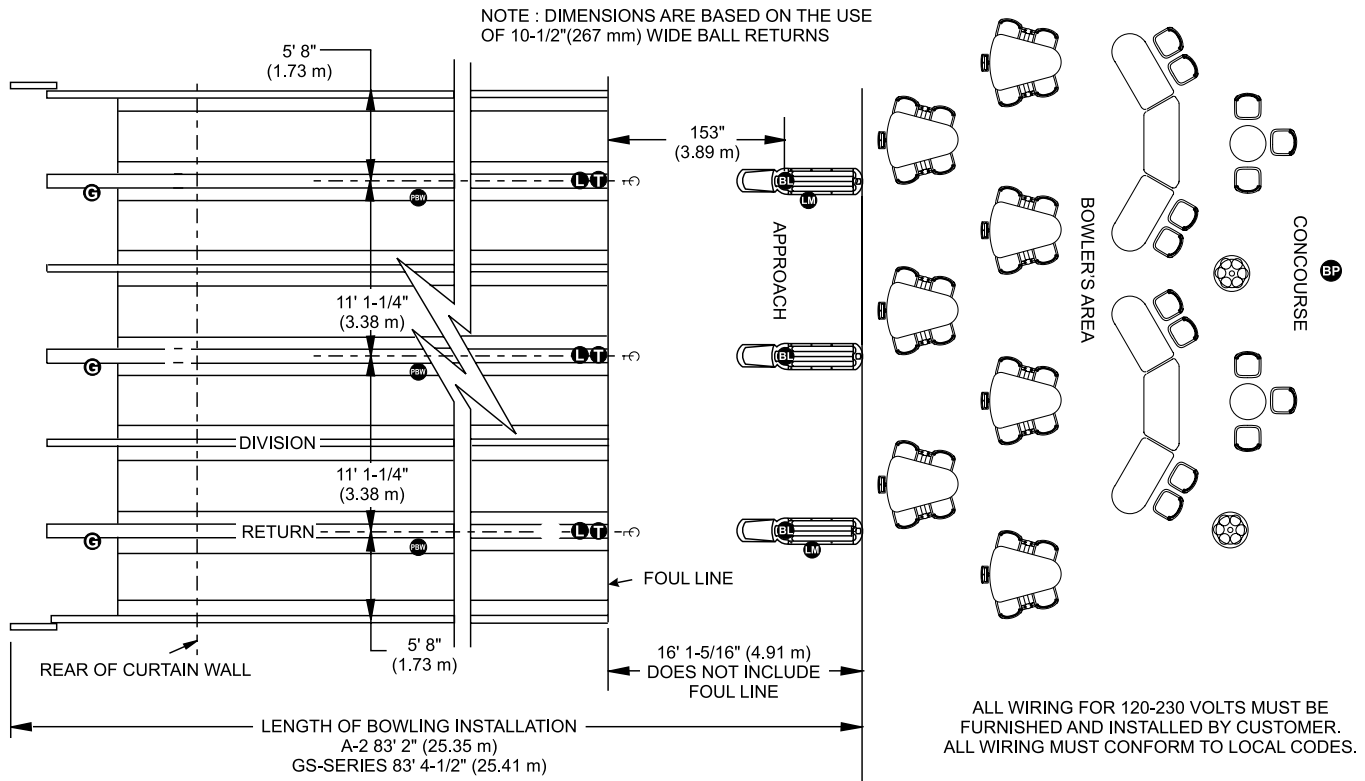
Power Requirements - Tel-E-Foul								
VOLTS	HERTZ	AC/DC	PHASE	AMP	WATTS	CIRCUIT REQUIREMENT	CUSTOMER RESPONSIBILITY	BRUNSWICK RESPONSIBILITY
120/230	50/60	AC	1	1	120	3 wire insulated ground with receptacle	To supply feeder wiring and "J" box and low voltage control. Customer/Electrician to connect.	To supply and install Tel-E-Foul and power cable to "J" box.

Circuit Requirements - Tel-E-Foul				
WIRES PER CIRCUIT	UNITS PER CIRCUIT	WIRE SIZE	BREAKER SIZE	RECEPTACLE SUPPLIED BY CUSTOMER
3	Up to 4	12 Gauge	20 A	Yes

Outlet Location - Tel-E-Foul

One junction box below the Tel-E-Foul units on each return near the foul line.

NOTE: Tel-E-Fouls switched by 2 lanes at control desk (supplied and installed by customer).



Ballworx Ball Polisher Power Outlet Information BP

Power Requirements - Ballworx Ball Polisher

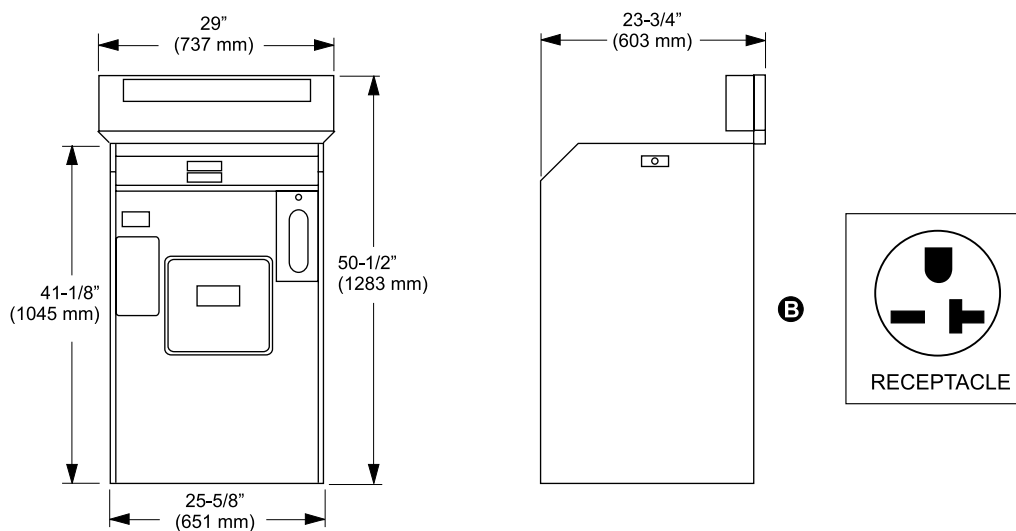
VOLTS	HERTZ	AC/DC	PHASE	AMP	WATTS	CIRCUIT REQUIREMENT	CUSTOMER RESPONSIBILITY	BRUNSWICK RESPONSIBILITY
208 230	50/60	AC	1	30 max. on demand	1500 to 2000	20 Amp, 3 wire, grounded outlet	To supply and install outlet at desired location in concourse area.	None

Circuit Requirements - Ballworx Ball Polisher

WIRES PER CIRCUIT	UNITS PER CIRCUIT	WIRE SIZE	BREAKER SIZE	RECEPTACLE SUPPLIED BY CUSTOMER
3	—	10 Gauge	30 A	Yes

Outlet Location - Ballworx Ball Polisher

One junction box at desired concourse location.

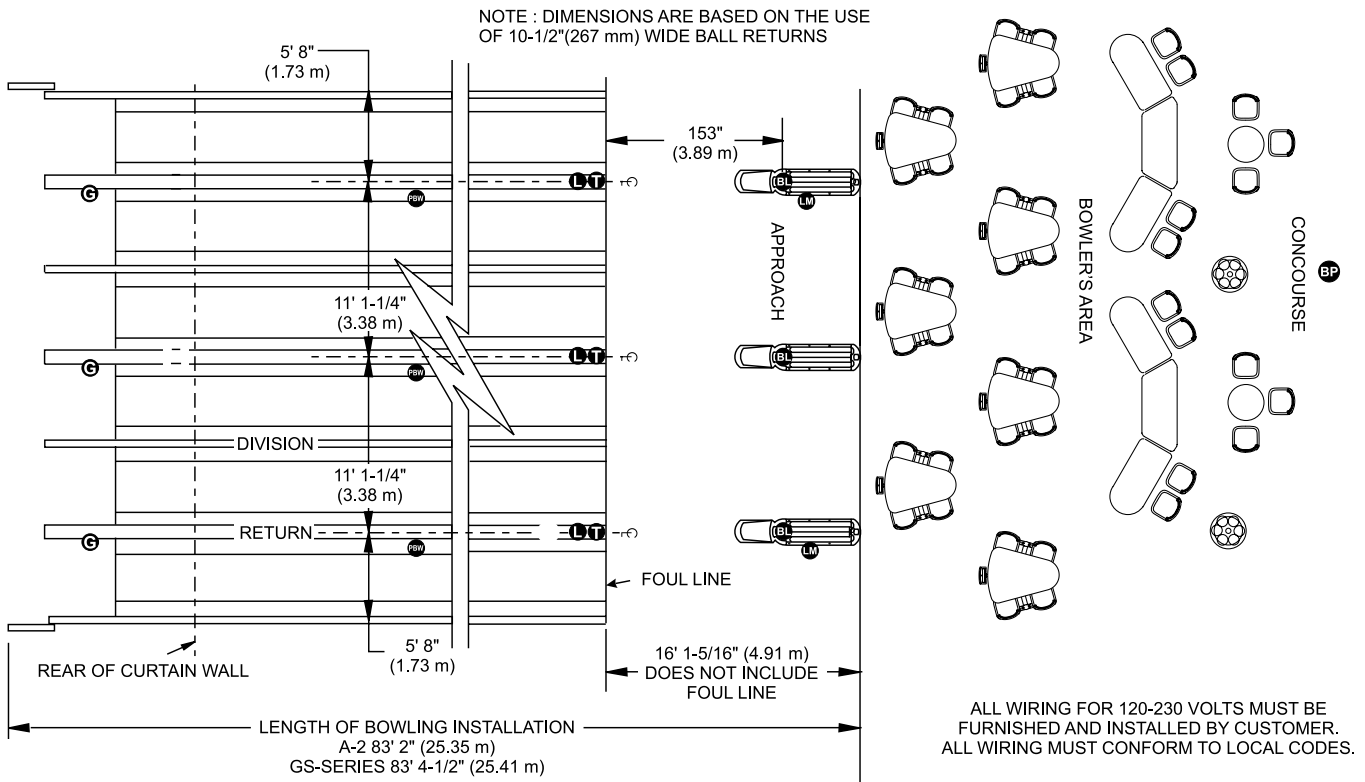


Lightworx Power Outlet Information **L**

Power Requirements - Lightworx								
VOLTS	HERTZ	AC/DC	PHASE	AMP	WATTS	CIRCUIT REQUIREMENT	CUSTOMER RESPONSIBILITY	BRUNSWICK RESPONSIBILITY
120/230	50/60	AC	1	1	120	3 wire insulated ground with receptacle	To supply feeder wiring and "J" box and low voltage control. Customer/Electrician to connect.	To supply power cable to "J" box.

Circuit Requirements - Lightworx				
WIRES PER CIRCUIT	UNITS PER CIRCUIT	WIRE SIZE	BREAKER SIZE	RECEPTACLE SUPPLIED BY CUSTOMER
3	10	12 Gauge	20 A	Yes

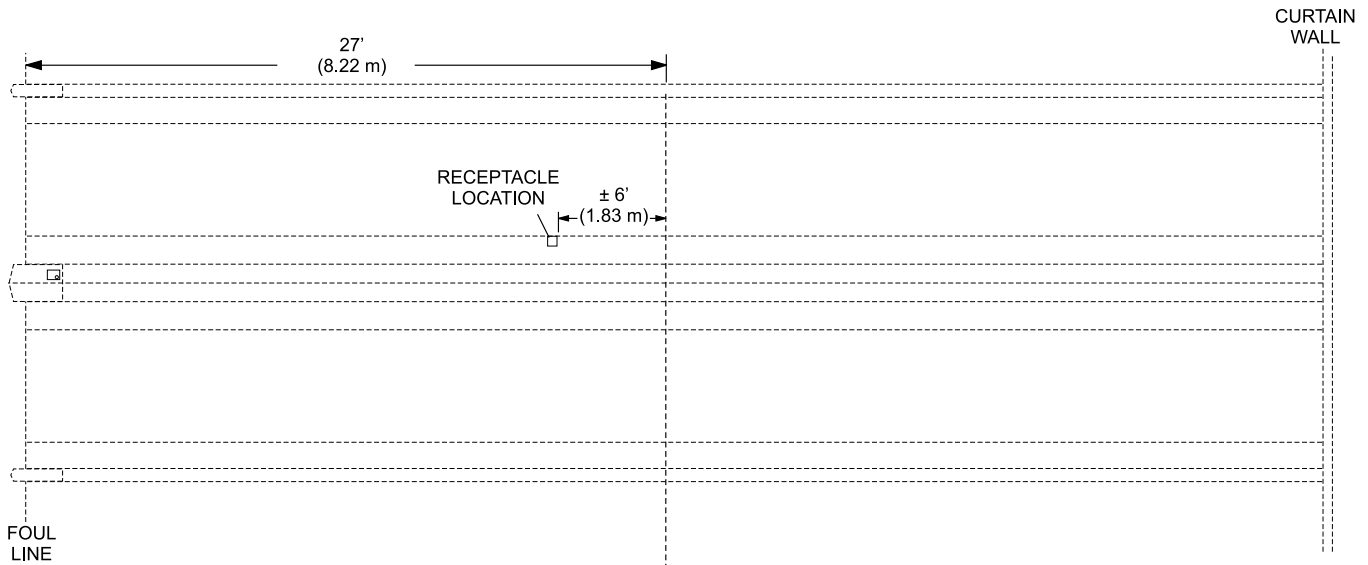
Outlet Location - Lightworx
 One junction box below the Tel-E-Foul units on each return near the foul line.



Automated Bumper System

All Scoring Systems

Electrical Information							
Volts	Hertz	AC/DC	Phase	Amps Per Unit	Watts	Branch Circuit	Customer Responsibility
100-130	50/60	AC	1	3.0@ 120V	360	2 Wires + Isolated Ground #12 AWG Wire	Install circuit with 120 Volt Hubbell I.G. 5262 receptacle or equivalent. No more than 4 units per 20 amp circuit.
200-240	50/60	AC	1	1.5@ 240 V	360	2 Wires + Isolated Ground #12AWG Wire	Install circuit with appropriate I.G. receptacle No more than 4 units per 16 amp circuit.



Installation Information
<p>Customer Responsibility: The customer must provide electrical power source that complies with local code. IMPORTANT: This power source should be supplied from scorer I.G. sub-panel.</p>

Ball Booster Power Outlet

Location

Ceiling mounted box with drop cord and receptacle to lane surface at center line of each ball return; 5' 3-1/2" from rear of 83' 2" (pit end). Reference *Figure 1*.

Power Supply

Must correspond to pinsetter voltage, 230v - 5 Amps; 208v - 5 Amps; 115v - 10 Amps.

Customer Responsibility

Supply and install all necessary feeder wiring to and including ceiling mounted junction box and drop cord (12 gauge, 3 wire type, "S" service cord, size .281" to .421" or conduit per local code). Customer to install receptacle (furnished by Brunswick) at the end of the drop cord.

Brunswick Responsibility

To supply receptacle (Hubbell #7484) for use at the end of the drop cord.

Raceway with Pull Wire

To be used, when required by local code, for automatic pinsetter control wiring (19 conductor, low voltage cables).

Location

Leading from manager's control panels to the rear of the curtain wall. Reference *Figures 2 & 5*.

Conduit Size:

8 LANES	1" (2.54 CM)
8-16 LANES	1.5" (3.81 CM)
16-24 LANES	2" (5.08 CM) OR 1" (2.54 CM) CONDUIT EVERY EIGHT LANES

All 90 Degree bends of conduit to have 1'10" (30.48 cm) minimum radius.

Customer Responsibility

To supply and install all raceways and fittings with pull wires from control station to center of area of lanes serviced by raceways, terminating at the rear of the curtain wall.

Brunswick Responsibility

To supply and install all 19 conductor cables in raceways, if required. One 19 conductor cable is approximately 5/8" (1.59 cm) diameter.

● Utility Grounded Outlets

Location

In concourse and pinsetter area as required for vending machines, water coolers, displays, feature lighting, vacuum cleaner, maintenance tools, etc.

Power Supply

115v, electrical grounded outlets.

Customer Responsibility

To furnish and install utility grounded outlets.

Brunswick Responsibility

None.

***IMPORTANT :** All wiring for 115-230 volts must be furnished and installed by customer all wiring must conform to local codes.*

● Junction Box

Low voltage control system of automatic pinsetters furnished and installed by Brunswick.

Location

On back of curtain wall, 8'0" (234.84 cm) above the playing surface, centered over bay of lanes. There will be one junction box for every 8 lanes. Reference *Figures 1,2,5*.

Customer Responsibility

Customer to furnish adequate mounting provisions on rear side of curtain wall.

Brunswick Responsibility

To furnish and install junction box.

Brunswick provides one automatic pinsetter control box for every 8 lanes, for incorporation into the control panel at the control area. The customer must install these control boxes, and Brunswick will wire them with 19 conductor, low voltage cables.

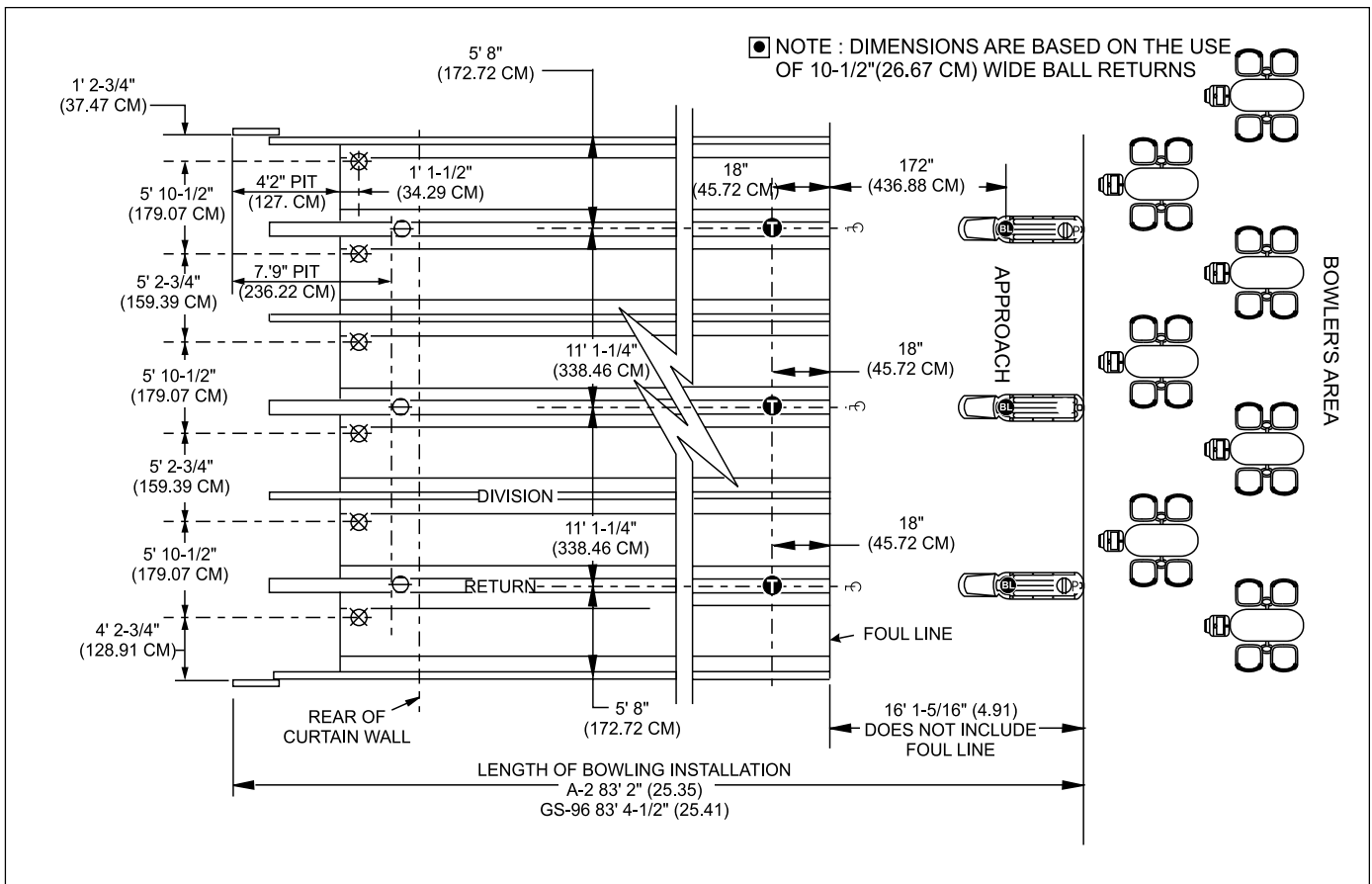


Figure 1. Bowling lanes Showing Electrical Symbols

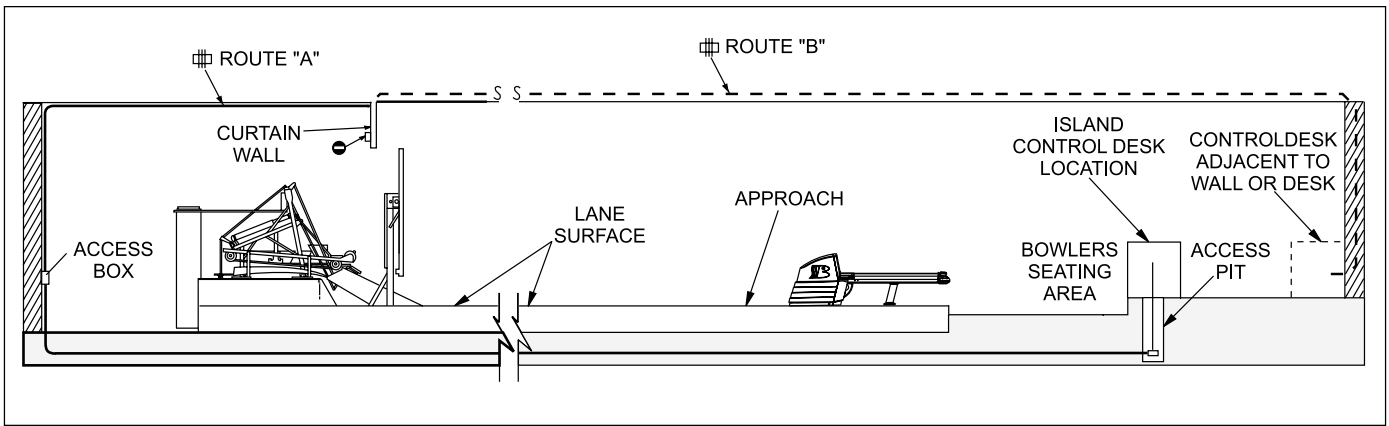


Figure 2. Suggested Raceway Installation From Curtain Wall to Control Desk

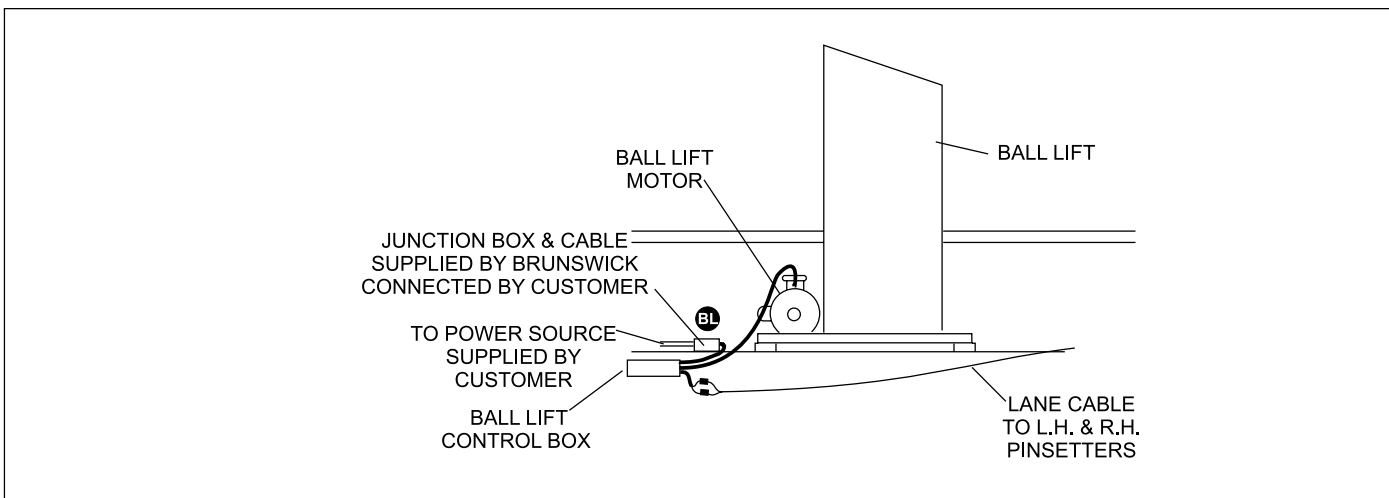


Figure 3. Ball Lift Control Box Electrical Detail

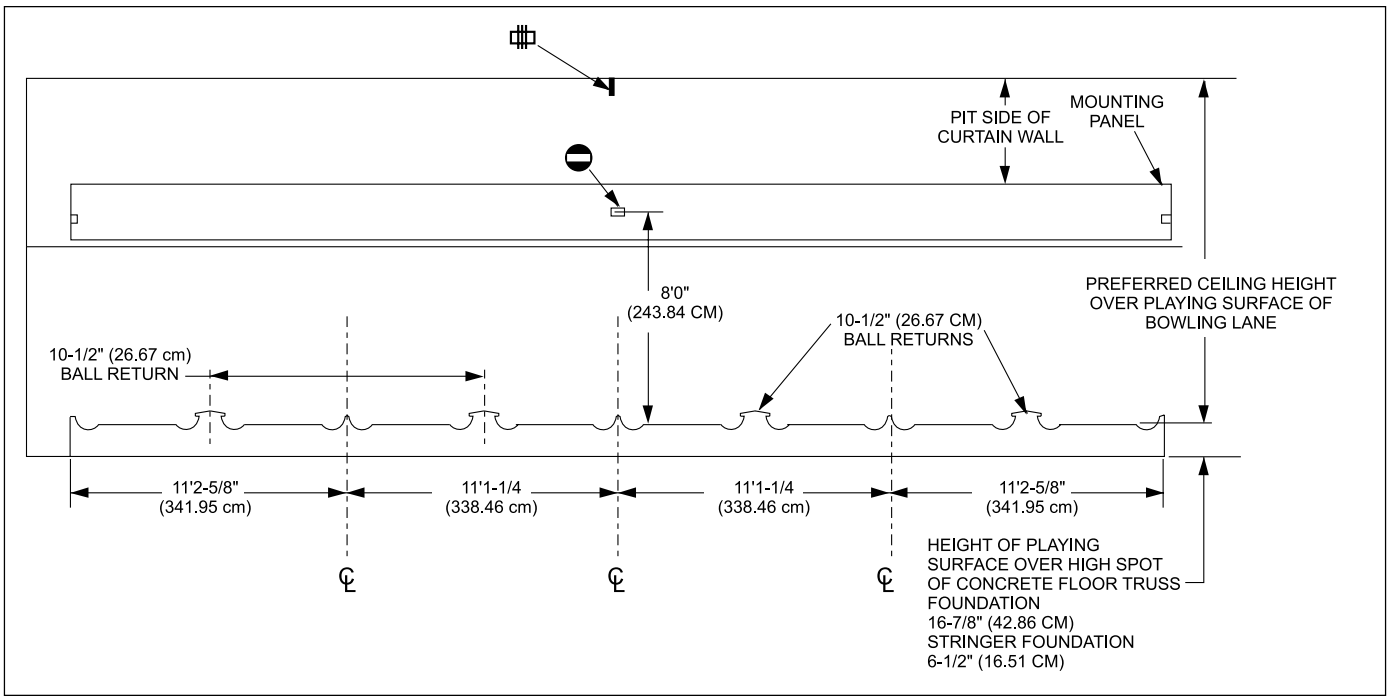


Figure 4. Rear Side of Curtain Wall

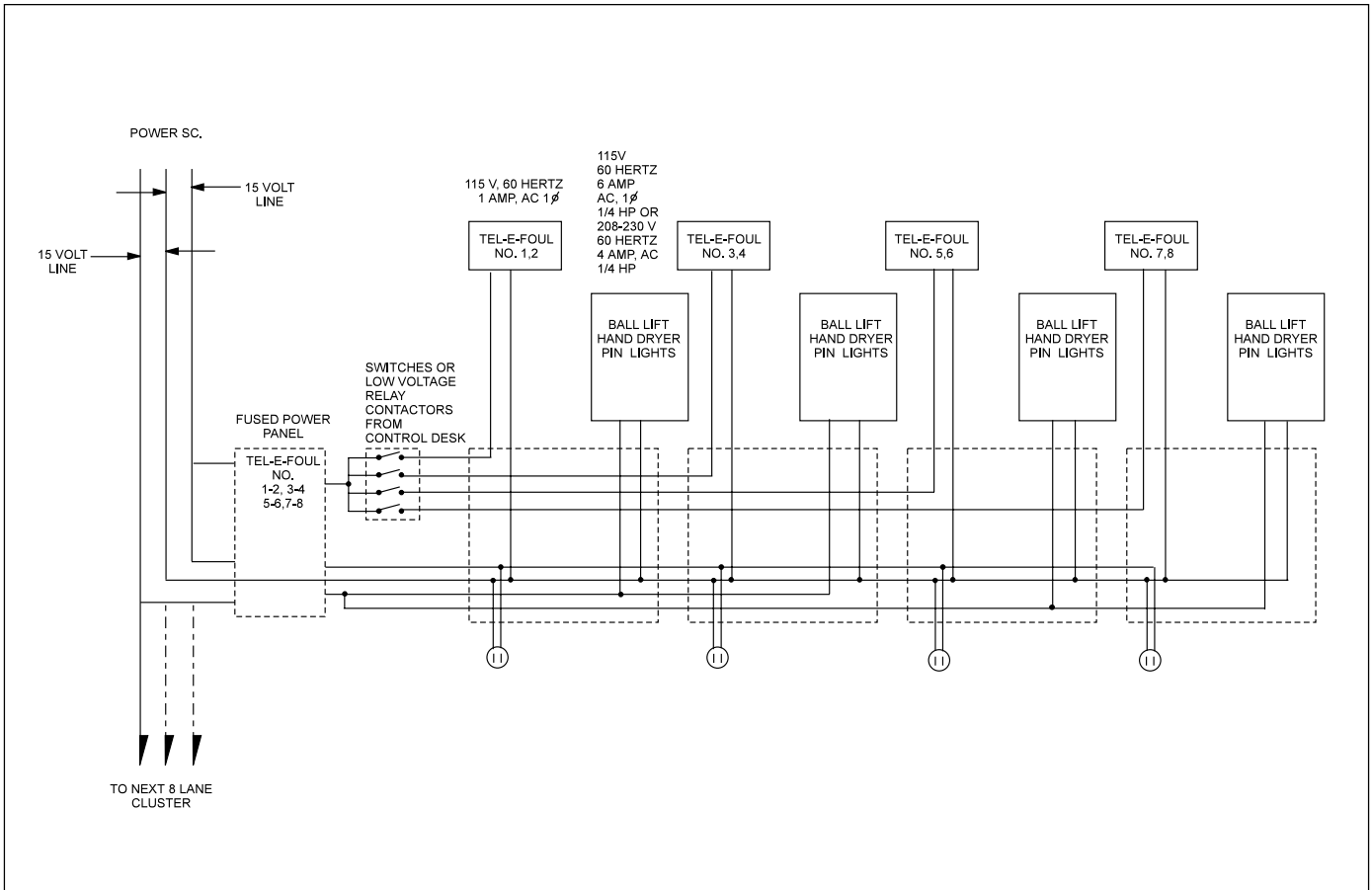


Figure 5. Suggested Schematic Wiring Diagram-Approach Area

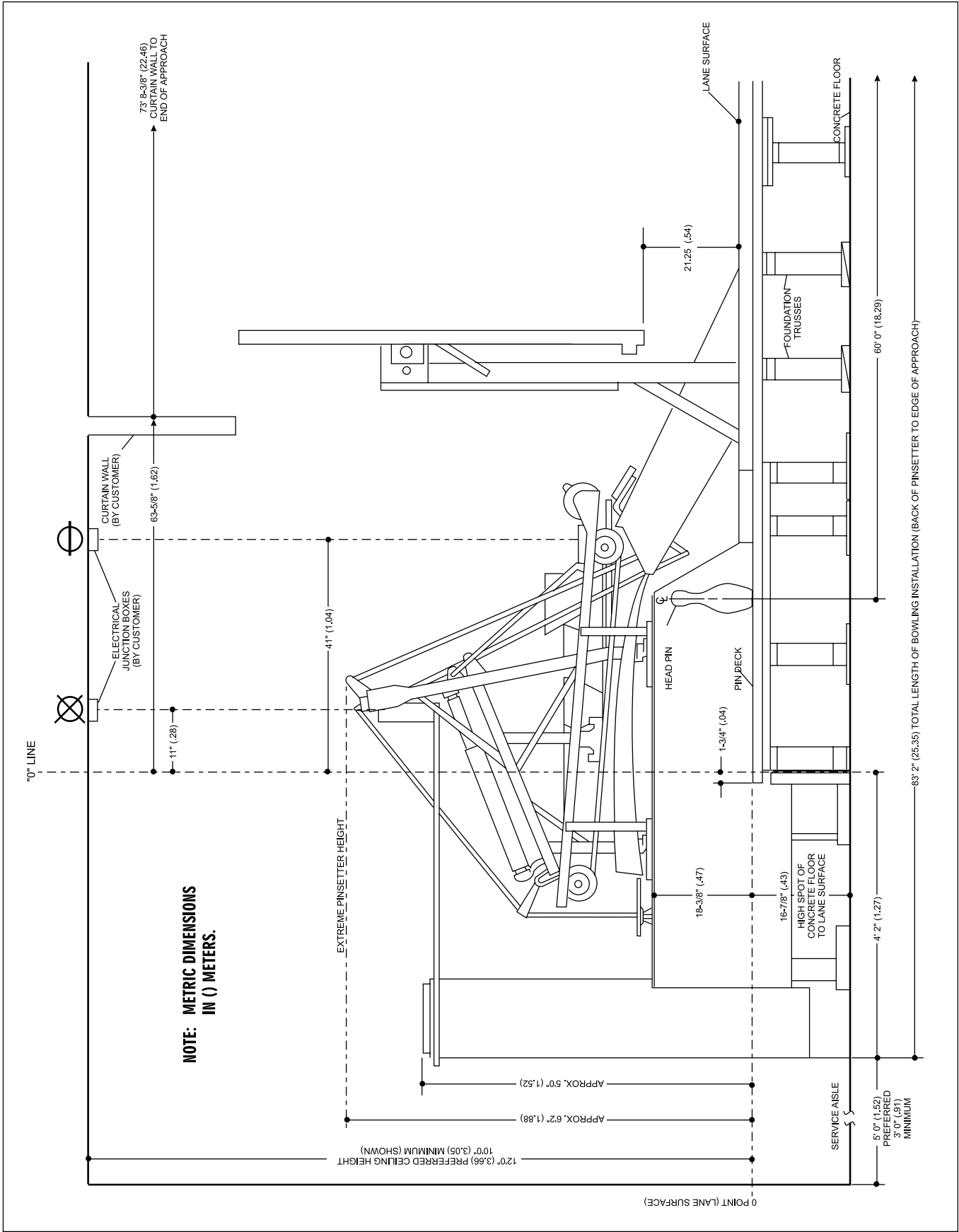


Figure 6. A-2 Pinsetter Area Dimensions

Bowling Lane Lighting Suggestions

It is the responsibility of the customer to furnish and install all lighting equipment in the building before installation of bowling lanes begins.

Accepted lighting on the playing surface of the lane between the foul line and the curtain wall is 20 to 25 footcandles of evenly maintained intensity measured at floor level. High output or fluorescent lighting fixtures are suggested; controlled in pairs of complete at the manager's control desk. If a sawtooth ceiling is used, light fixtures should be placed low on the vertical surface of the sawtooth, but high enough to be shielded from the bowler's view. The amount of incident light directly illuminating masking units shall be less than 10 footcandles.

Average Pinsetter area lighting intensity (behind curtain wall) is 365 footcandles of even illumination over the machines. Pinsetter area lighting should avoid putting light on the lane area between the masking unit and the pinsetter. The area on the mechanic's work bench should have 75 to 100 footcandles of illumination.

Recommended spectator or concourse area intensity is 10 to 30 footcandles. Lighting should be flush-mounted or recessed ceiling fixture, with no direct exposure of light sources into the bowler's seating area or approach.

The bowler's seating area should have 10 to 15 footcandles general illumination.

Recommended approach area intensity is 5 to 10 footcandles. No additional lighting is required, but if used, it should be separately switched or on dimmer controls at the control desk.

All lighting in the building is recommended to be controlled by switches at the manager's control desk, not by the bowler.

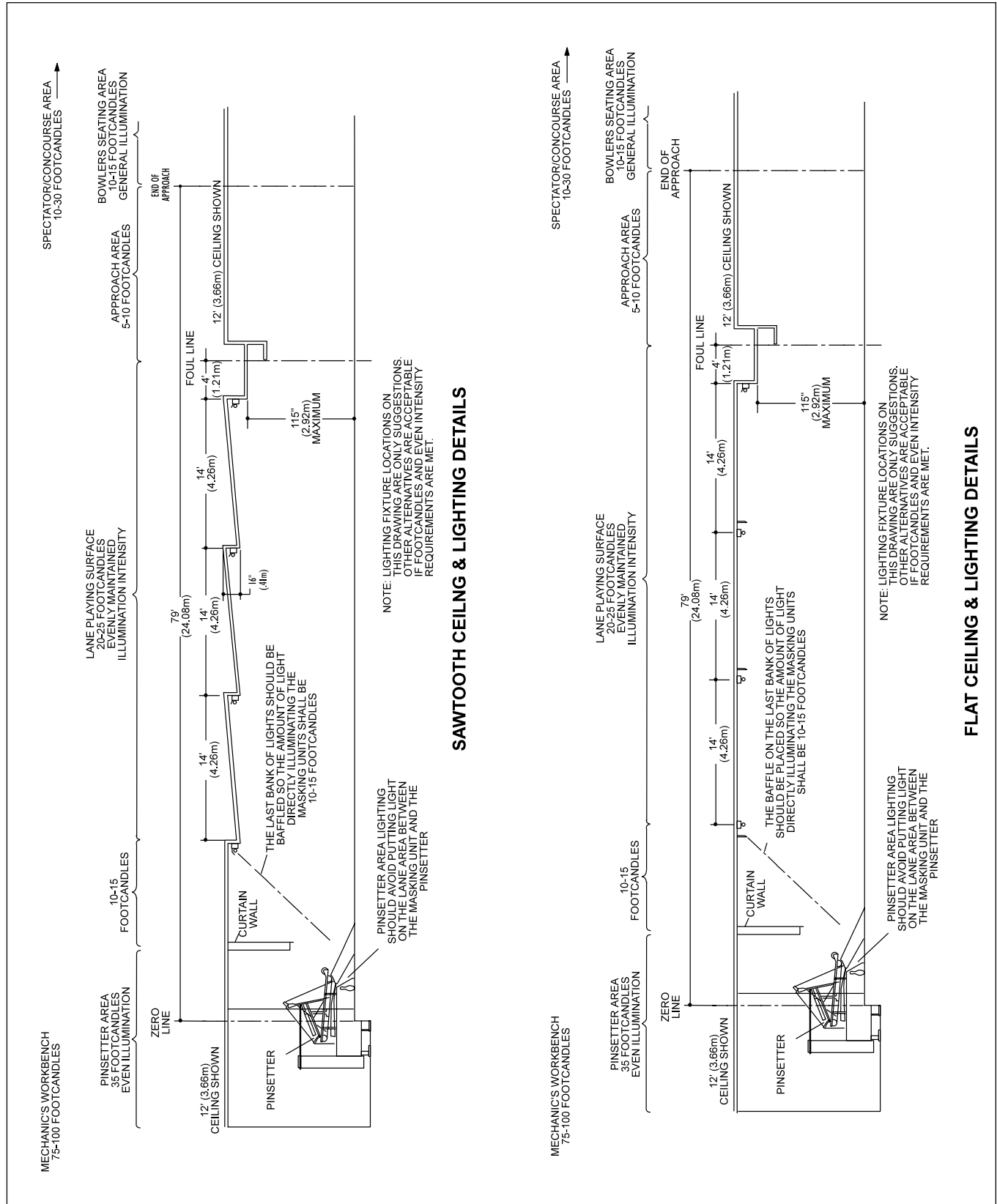


Figure 8. Ceiling Lighting Details