
A DESIGN & RESEARCH PRIMER

Lighting in Retail

Objectives, light sources, store design and the latest developments in LED lighting for retail

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What this deck covers

01

Objectives of good retail lighting

What lighting must do for the customer, the merchandise and the brand

02

Types, components & units of light

Lamp families, why LED, fixture types, anatomy of a luminaire, lumen / lux / CCT / CRI

03

Lighting design for stores

Layers of light, typical plans and sections, lux targets and what gets measured on site

04

Trends & latest developments (2025-26)

Trial-room lighting, human-centric light, autonomous controls, open standards, circularity, evidence and a spec checklist

SECTION 01

Objectives of good retail lighting

What retail lighting has to achieve

The quantity and quality of illumination, the impression it creates about the merchandise and the effect it has on the retail area's appearance all decide whether a lighting design succeeds. A designer weighs light life, system efficiency, lumen maintenance, colour rendering and appearance, daylight integration, light distribution, points of interest, cost, control and flexibility.

Attract

Pull customers into the store and guide them through it safely and effectively

Make a statement

Reinforce brand and identity; signal image and price range

Create comfort

An aesthetically pleasing environment with a sense of well-being

Show the merchandise

Highlight features and displays; enhance colour, texture and form without glare

Promote evaluation

Help the customer judge the product and initiate the purchase

Close the sale

Support the checkout and the final decision

Reduce energy cost

Deliver all of the above at the lowest running cost

SECTION 02

Types, components and units of light

Lamp families, and why LED won

Lamp types in a lighting system

1. Incandescent lamps
2. Compact fluorescent lamps
3. Halogen lamps
4. Metal halide lamps
5. **Light Emitting Diode (LED) — current standard**
6. Fluorescent tube
7. Neon lamps
8. High intensity discharge lamps
9. Low pressure sodium lamps

Efficient

More lumens per watt than any legacy source; no overheating

Long life

3–5 year service life; warranties up to 5 years

Clean

No hazardous disposal waste

Cost effective

Lower total cost once efficiency and life are counted

Tunable

Wide range of colour temperatures, 1000 K to 6000 K and beyond

Flexible

Custom sizes and forms; works with sensors for mood lighting

Connected

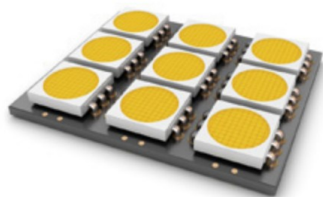
Digitally controllable; can carry data (Li-Fi) in emerging uses

Local

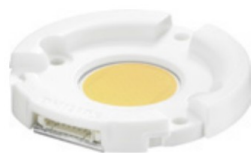
Manufactured in India

LED packages and the anatomy of a luminaire

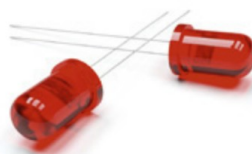
SMD (Surface Mounted Devices),
CoB (Chips on Board) and 5 mm LEDs



SMD LED



CoB LED

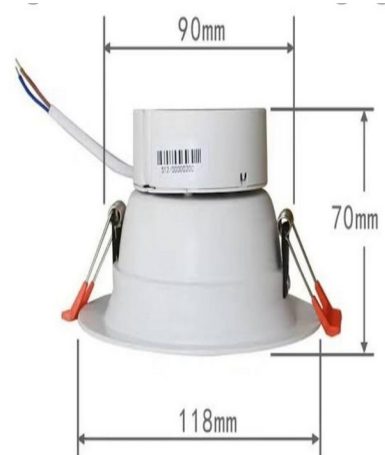


5 mm LED

SMD (surface mounted), COB (chip on board) and 5 mm LEDs



Exploded downlight



Dimensions

SMD

Surface-mounted chips on a board; the workhorse for linear and panel fixtures

COB

Many chips on one substrate; single dense light source, ideal for spots and downlights

5 mm

Through-hole indicator-type LEDs; signage and decorative use

Components of a fixture

LED chip · body / casing · reflector and optics · driver · housing — each decides output, beam, heat and life

Fixture types used in stores

Surface mounted

Visible on the ceiling

Concealed

Recessed; concealed metal casing

Diffused

Soft, even light through a diffuser

Pendant

Hung; decorative and ambient

Suspended trunk

Continuous linear runs

Studio

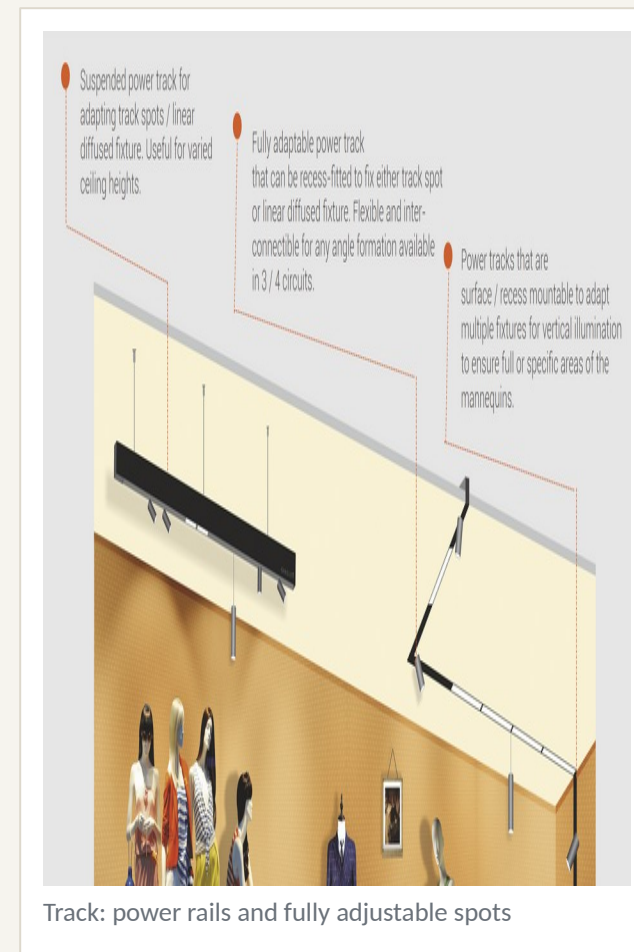
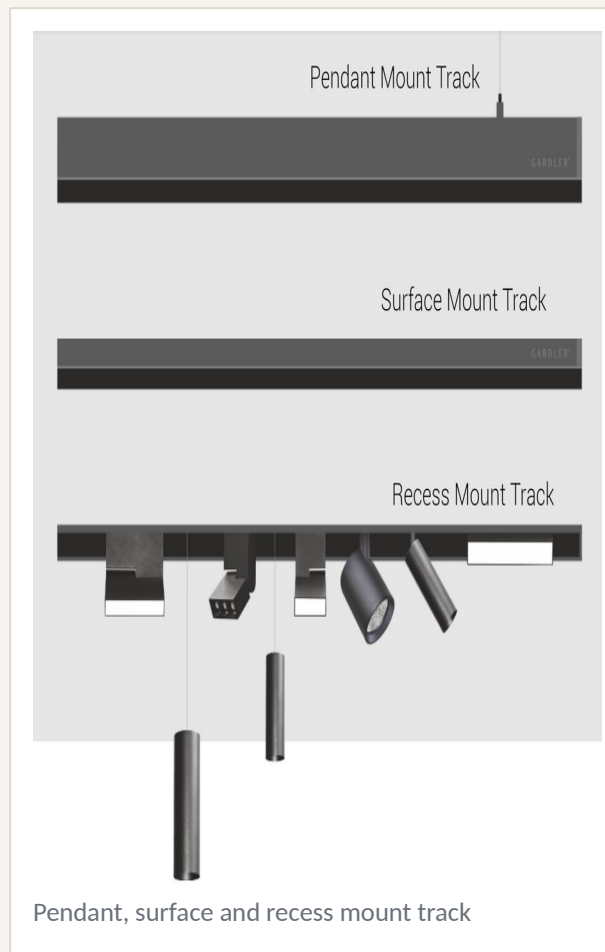
High-output directional lights

Track — individual

Spots repositioned as displays change

Track — all in one

Linear washer, wall washer, spotlight and suspended light on one track



Units of measurement

Lumen (lm)

SI unit of luminous flux: the light emitted per second into one steradian from a one-candela source

Lux (lx)

Lumens per square metre — what a lux meter reads on the floor, wall or window

Footcandle (fc)

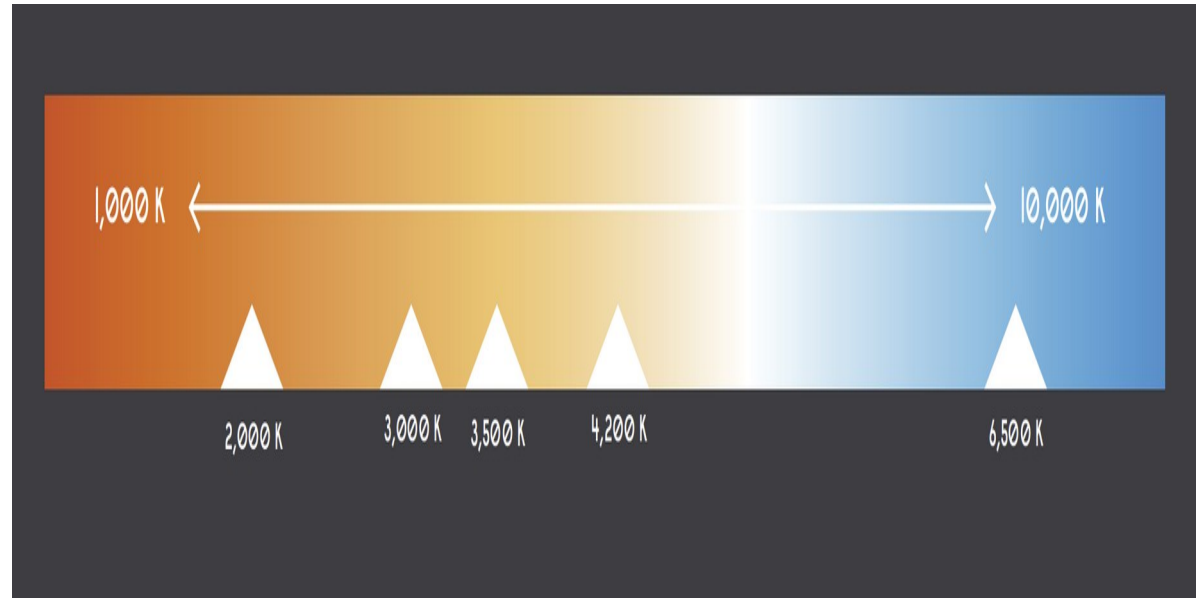
Lumens per square foot; 1 fc = 10.76 lx

Colour temperature

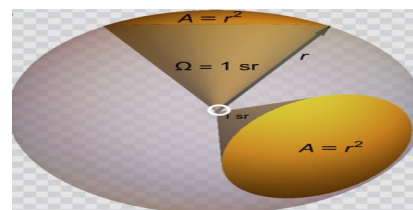
Appearance of the white light, 1000 K to 10,000 K: 2700 K warm to 6500 K daylight

CRI

Colour Rendering Index — how faithfully colours appear; above 90 is better for apparel



Colour temperature scale, 1,000 K to 10,000 K



Steradian

The solid angle used to define the lumen: a cone cutting an area r^2 on a sphere of radius r

From source to eye: four quantities

Luminous flux

Light emitted by a source — lumens. Describes the brightness of produced light

Luminous intensity

Light emitted in a direction — candela. The brightness of a beam

Illuminance

Flux landing on a unit area — lux. What the design targets and the meter reads

Luminance

Light leaving a surface per unit area in a direction — cd/m^2 . Affected by the object's qualities

UNDERSTANDING LIGHT

Luminous Flux amount of light emitted by a source

- Measured in Lumens
- Describes the brightness of produced light

Luminous Intensity amount of light emitted in a direction

- Measured in Candelas

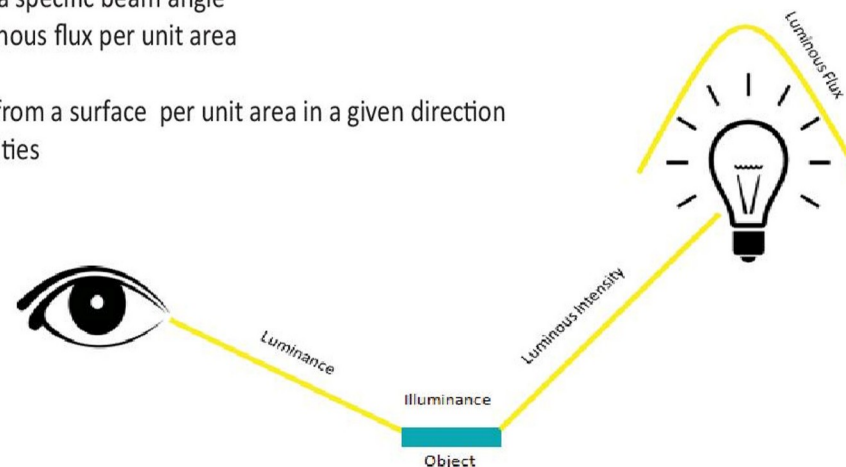
Describes the brightness of a specific beam angle

Illuminance measuring luminous flux per unit area

- Measured by Lux

Luminance of light emitted from a surface per unit area in a given direction

- Affected by object's qualities



Source → beam → surface → eye

Recommended illuminance by retail activity

Areas/Tasks	Description	Type of Activity Area *	Illuminance (FC) ²
Circulation	Area not used for display or appraisal of merchandise or for sales transactions	High Activity	30
		Medium Activity	20
		Low Activity	10
Merchandise (Including Showcases and Wall Displays)	That plane area, horizontal to vertical, where merchandise is displayed and readily accessible for customer examination	High Activity	100
		Medium Activity	75
		Low Activity	30
Feature Displays ³	Single item or items requiring special highlighting to visually attract and set apart from the surround	High Activity	500
		Medium Activity	300
		Low Activity	150
Show Windows			
Daytime Lighting			
General			200
Feature			1000
Nighttime Lighting			
General			100-200
Feature			500-1000

*One store may encompass all three types within the buildings.

High Activity: Merchandise is usually displayed in bulk and is readily recognizable as to its use. Evaluation and viewing time is short. Minimal sales assistance and few customer amenities are available. Included in this category are mass merchandisers, warehouse sales, grocery and discount stores, auto parts departments, and hardware departments.

Medium Activity: Merchandise is familiar, but the customer may require time or help in evaluation of quality or usage or in the decision to buy. Some sales assistance and customer amenities are available. Included in this category are department and specialty stores.

Low Activity: Merchandise is generally exclusive, of the finest quality and highest price. Personal services and premium customer amenities are expected. Shopping is generally unhurried. Included in this category are fashion boutiques, designer signature shops, jewelry stores, fur salons, and fine art galleries.

Illuminance levels in footcandles by area and activity (1 fc = 10.76 lx)

10-30

fc — circulation (110-320 lx)

30-100

fc — merchandise, showcases, wall displays (320-1,080 lx)

150-500

fc — feature displays (1,600-5,400 lx)

200-1000

fc — show windows, daytime

Reading the table

Levels rise with the selling intensity: self-service and low-assistance formats need brighter, more uniform light; premium formats rely on contrast rather than brightness

SECTION 03

Lighting design for stores

Four layers of light in a store

General (ambient)

The main source of illumination and the base level of the space. With LED sources it is the first place to look for energy reduction, because the other layers can carry more of the visual work.

Task

Focused, localised and higher-level light for a specific activity — checkout, trial rooms, alteration counters. Essential to the functioning of the space, so efficient sources matter most here.

Accent

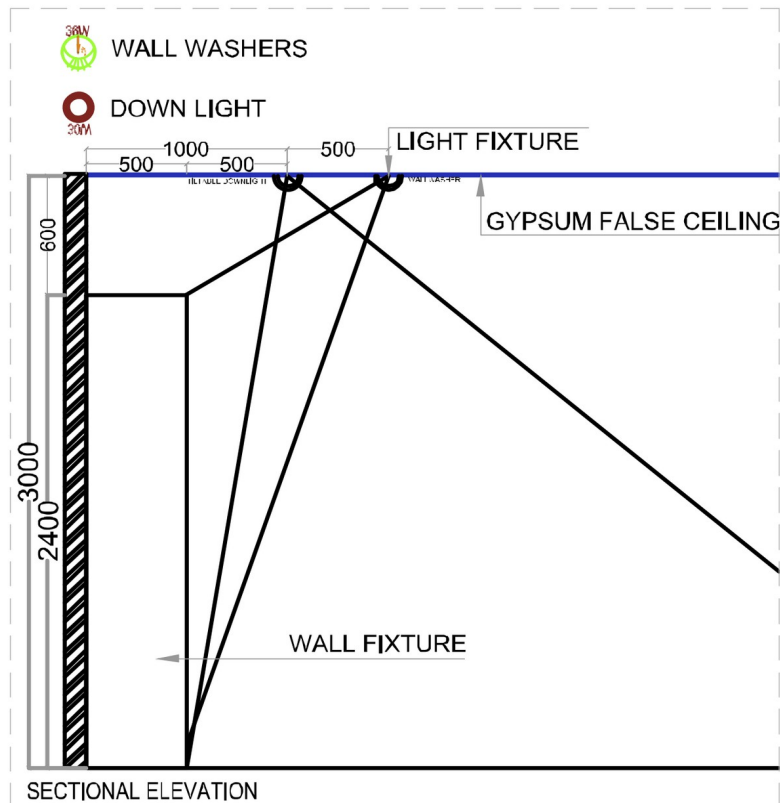
A point source aimed at merchandise to create emphasis: depth, contrast and a focal point that reveals shape, texture, finish and colour. Aimed carelessly it produces shadows that hide detail and glare that distracts.

Decorative

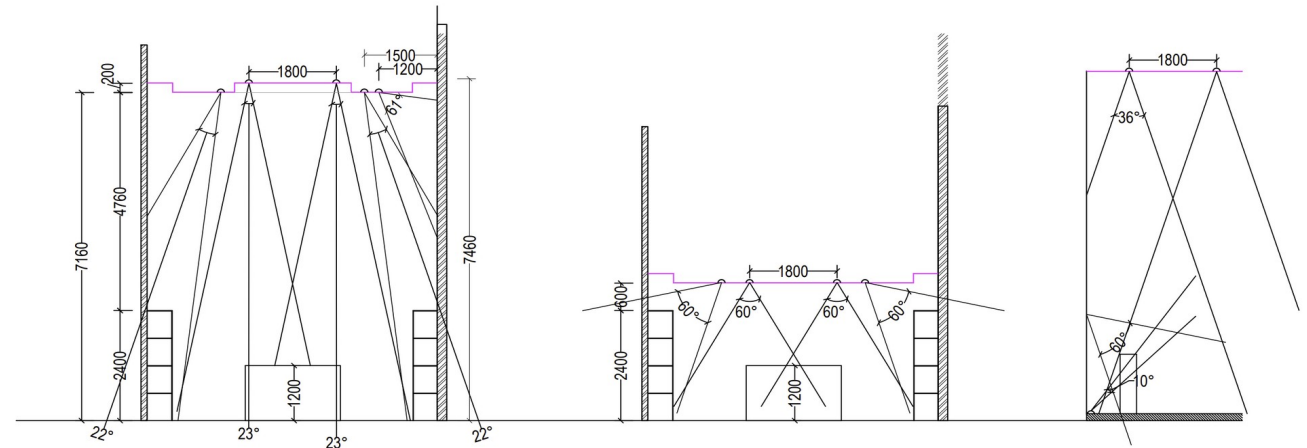
Pendants, sconces, chandeliers, table and floor lamps and cylinders: part of the lighting plan and a design element in their own right, adding visual interest while contributing to the overall levels.

Combining and balancing the four layers gives visual interest to the space and creates a more attractive, exciting and inviting environment than any single layer can.

Typical lighting design for a store — sections



Sectional elevation: wall washers, downlights and track at the gypsum false ceiling

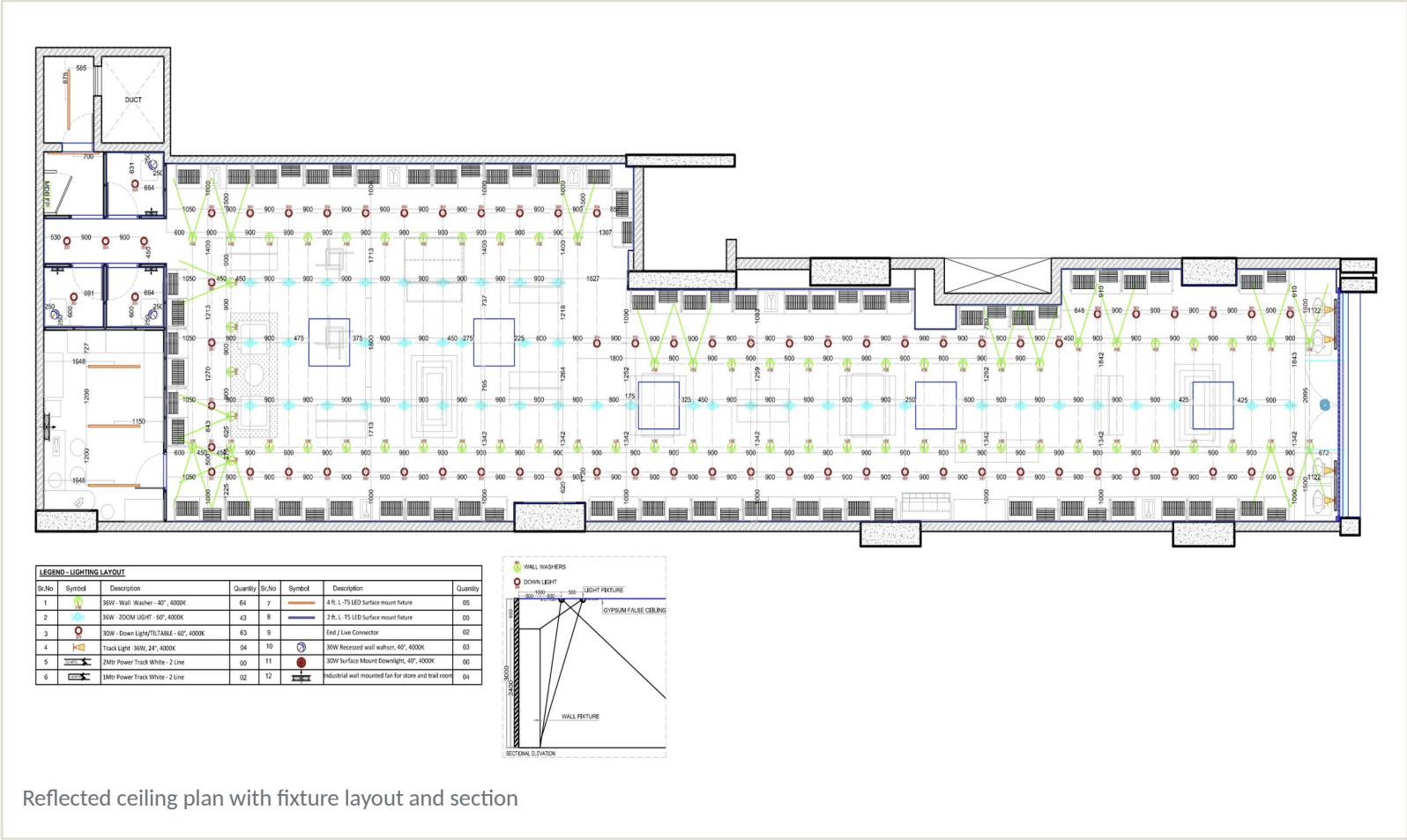


Section through the sales floor with beam angles

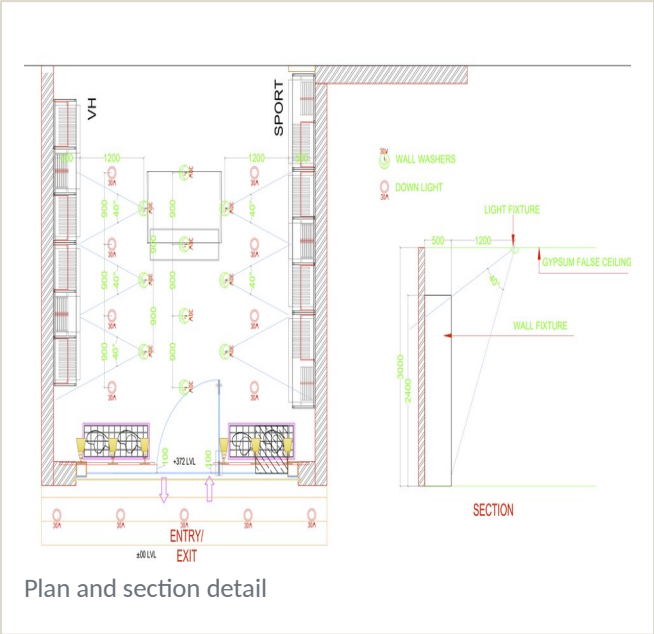
What the section fixes

Mounting height, beam angle and offset from the wall decide whether a wall washer grazes the merchandise or lands on the floor. Set these before choosing fixtures.

Typical lighting design for a store — plan



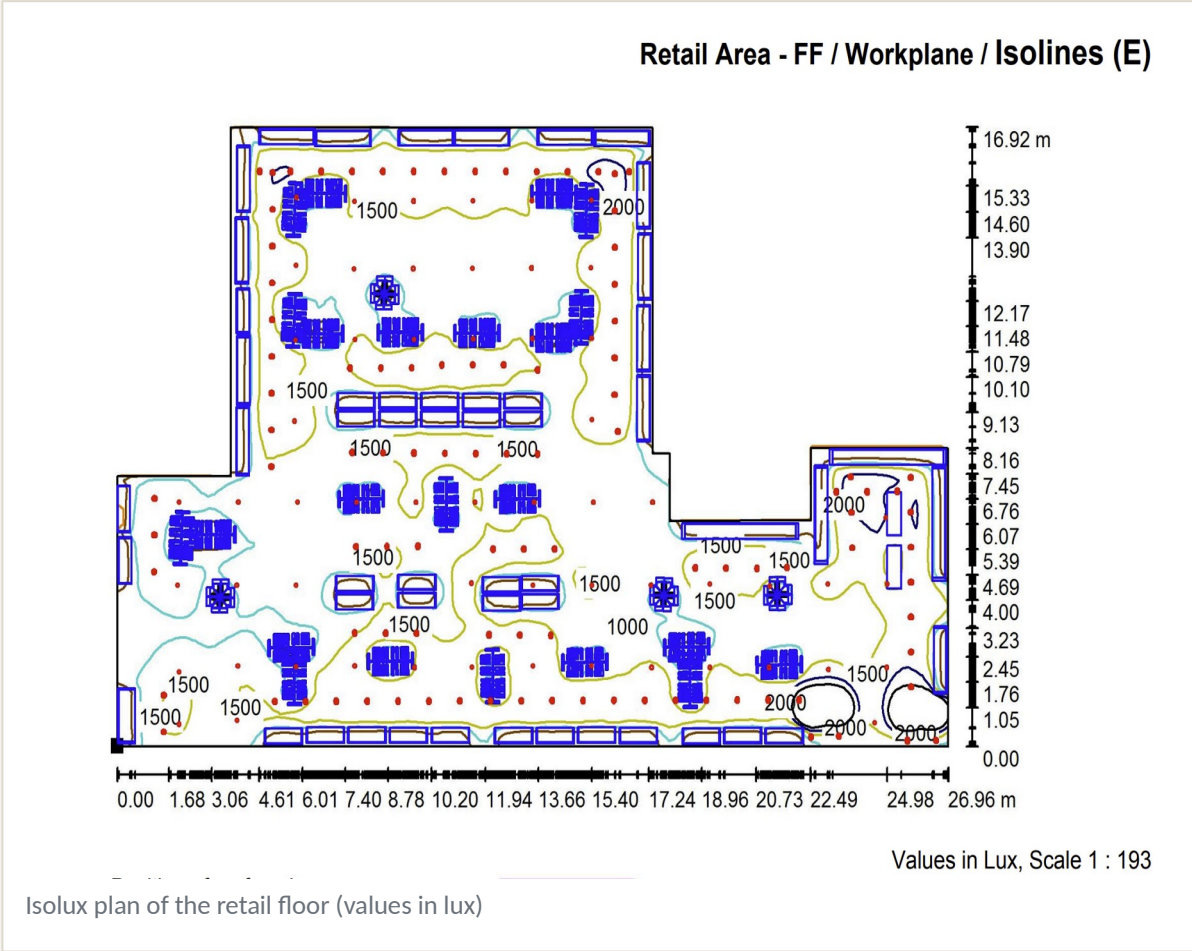
Reflected ceiling plan with fixture layout and section



Plan logic

Track runs follow the fixture walls; downlights set the ambient grid; the entry and windows get the highest levels.

Lux levels: design targets versus measured output



Target

700 lx

Floor level

1,800 lx

Wall at 3 ft height

2,000 lx

Show windows

Measured

1,062 lx

Floor level

1,500 lx

Wall at 3 ft height

1,700 lx

Show windows

Measure properly

Use a calibrated lux meter at the working plane. Do not use mobile apps to measure lux levels — the readings are not reliable enough to accept or reject a fit-out.

SECTION 04

Trends and latest developments in retail LED lighting (2025-26)

Trial rooms and human-centric lighting

Mood lighting

Scenes the customer can switch between

Three colour temperatures

Cool, neutral and warm presets to see the garment in daylight, store and evening light

Auto dimming

Levels fall when the room is empty

Motion sensing

Light comes on with the customer, saving energy between uses

HUMAN CENTRIC LIGHTING • MIND + BODY + LIGHT

How does lighting make you feel?

Lighting does more than let us see. It affects mood, alertness and health. Human Centric Lighting (HCL) designs the colour temperature and intensity of light around the people in the space — staff who spend a full shift under it as much as customers who spend twenty minutes — and has moved from a trend to a standard expectation in commercial design.

From LED conversion to refinement

LED adoption in retail has crossed its threshold. The market has moved past the conversion phase into a value-added era: competition is now on controls, light quality, form factor and circularity, not on the LED itself. Five shifts define 2025–26.

01

Autonomous controls

From app-controlled bulbs to sensor-driven systems that schedule, dim and harvest daylight on their own

02

Tunable, human-centric light

Colour temperature and intensity that change by zone and time of day, now practical and mainstream

03

Light quality

High CRI, low flicker and consistent colour across fixtures as baseline specifications

04

Minimal, integrated fixtures

Light sources disappearing into architecture: continuous linear runs, magnetic track, precision optics

05

Circularity & LED-to-LED retrofit

First-generation LEDs reaching end of life; serviceable, modular luminaires and open interfaces

Smart, autonomous controls and open standards

What the controls now do

- Occupancy sensing drops levels in empty zones; motion brings them back
- Daylight harvesting holds a constant lux near windows and skylights while cutting wattage
- Scheduling follows trading hours; scenes switch for launches, seasons and events
- Fixtures carry the sensors themselves — intelligence built in rather than wired separately
- Universal dimming compatibility is becoming the default spec, simplifying driver selection
- The useful version of 'smart' is infrastructure: switches, sensors and building-level control, not phone apps

DALI-2 • D4i

Standardised digital control; D4i drivers hold luminaire data for asset management and predictive maintenance

Zhaga Book 20 / Zhaga-D4i

Plug-and-play mechanical and electrical interface so sensors and nodes on a luminaire can be replaced or upgraded

Matter + Thread

Open interoperability layer spreading from homes into light commercial; products without it are losing share

Light quality and human-centric lighting by zone

Sales floor

3500–4000 K, CRI 90+

Clean neutral white; consistent colour so garments read true across the floor

Trial rooms

2700–3500 K, tunable

Warm presets flatter skin tones; tunable white lets the customer check the garment in several lights

Colour-critical

CRI 95+

Cosmetics, jewellery, fresh food: rendering quality beats brightness

Windows & façade

High output, dynamic

Daylight-competing levels by day, scene-based or addressable by night

Flicker is now a specification item: low-flicker drivers avoid headaches and camera banding, which matters as customers film in store.

WHAT THE RESEARCH SAYS

- An Indian study of mid-range apparel stores found the most preferred combination was 5700 K at 500 lux, and that perceived brightness rises with colour temperature — preferences differ from Western norms
- A Serbian experiment found 4230 K raised perceived product quality against 2200 K, while cooler light shortened time spent shopping
- Brightness guides behaviour: shoppers consider more products under higher levels and follow light contrasts through the store
- Research on human-centric lighting now stresses adoption: simple presets beat endless customisation

Fixtures and form factors

Minimal, integrated

Light sources disappear into architecture: recessed channels, coves and invisible fixtures as the dominant design direction

Continuous linear runs

Seamless architectural lines replacing troffers and scattered downlights for clean ceilings

Magnetic & 3-circuit track

Precision optics, mini spots and adjustable beams on track that follows merchandise moves

COB shelf and cabinet strips

Dot-free, high-CRI tape for premium shelf lighting; snap-in mounting cuts installation labour

Addressable & dynamic

DMX pixel control for façades, windows and events; animated festival displays

Higher efficacy

More lumens per watt and better lumen maintenance in each generation, driving the LED-to-LED retrofit case

Sustainability, circularity and compliance

LED-to-LED retrofit cycle

First-generation LED fixtures from the early 2010s are reaching end of life. The next upgrade is LED to better LED: higher efficacy, controls-ready drivers and lower maintenance, planned into renovation cycles rather than as emergency replacement.

Serviceable luminaires

Zhaga-D4i and modular designs allow drivers, LED modules and sensors to be replaced or upgraded in place, extending fixture life and protecting the capex rather than discarding the whole luminaire.

Lighting as a Service

Operators lease lit space with performance guarantees; the supplier owns efficiency and upkeep. Emerging in large formats where the energy saving funds the service.

Energy and rebates

Sensor-driven LED displays run on well under half the energy of legacy systems; utility and ESG programmes increasingly reward tunable white and controls, not only the lamp swap.

INDIA • COMPLIANCE

- BIS certification (IS 16103) for LED luminaires
- NBC 2016 Part 8 illuminance recommendations for retail
- Fire-safety ratings on fixtures and emergency lighting with battery back-up
- ECBC energy-efficiency compliance for lighting power density
- Specify fixtures on certified data, not catalogue claims

What the evidence says about lighting and sales

+19%

sales growth at US grocers after switching to LED, in an ENERGY STAR study

+6% / +15%

sales and foot traffic in LED-lit areas over a 21-week German study

+15–20%

dwelt time reported after lighting redesigns

2×

items picked from shelves with integrated lighting versus unlit shelves

~45%

cut in display-lighting energy at a Chennai supermarket after LEDs with sensors

up to 70%

energy cost reduction cited for LED plus controls against legacy systems

Read these with care

Most figures come from supplier case studies and sector reports, not controlled trials; effects vary by format and are strongest when a relamp is paired with better colour rendering and a redesign of the layers. The sound conclusion is the direction, not the decimal: better light measurably lengthens visits and lifts conversion.

Sources are listed at the end of the deck.

A specification checklist for store design

1

Design to lux targets by zone

Floor, wall, window and trial room each get a target; verify with a calibrated meter at handover

2

CRI 90+ as the floor

95+ where colour sells: cosmetics, accessories, premium apparel

3

Tunable white in trial rooms

Three presets and auto-dim; the cheapest conversion lever in an apparel store

4

Open-protocol controls

DALI-2 / D4i with occupancy and daylight sensing; avoid proprietary lock-in

5

Serviceable fixtures

Replaceable driver and LED module; Zhaga interfaces where available

6

Low-flicker drivers

Specify flicker metrics; customers film in store

7

Plan LED-to-LED refresh

Put first-generation LED replacement into the renovation calendar, not the breakdown budget

8

Measure the outcome

Track dwell time and conversion before and after a lighting change, by store

Sources consulted for the 2025–26 research section

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- ARMOR Lighting — Retail Lighting Trends 2026: Minimal Design, Human-Centric Light, Smart IoT (armorlighting.com)
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- Sourcingready — United States Lighting Market Report 2026 (sourcingready.com)
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- LIFX — What's New at CES 2026: Matter and Thread (lifx.com)
- Building and Environment (ScienceDirect) — Effects of lighting conditions on user preferences in retail apparel stores, within the cultural context of India
- ResearchGate / Academia — The influence of retail facility lighting on shoppers' product perception (Serbian study)
- Dominion Lighting — How Smart Retail Lighting Design Boosts Store Sales (ENERGY STAR and German study figures)
- US LED — Retail Lighting: Enhancing Customer Experience and Driving Sales (usled.com)
- Lux Light Designs — Top 7 Retail Lighting Design Trends 2025, India (luxlightdesigns.com)

Web sources accessed October 2026. Sections 01–03 draw on the author's original training material and store lighting designs.



Thank you

Good light sells the merchandise, flatters the customer and pays for itself. The next decade of retail lighting is about controlling it well and keeping it in service longer.

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