

FIELD MANUAL · VOLUME 05

Linear Lighting. Standards.

Hybrid Lutron-control / Q-Tran-power linear systems for
luxury residential construction. Channel-first, no exceptions.

PREPARED FOR

Lighting Designers · Electricians · Drywallers · Millworkers · GCs · Owner's Reps

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MANIFESTO

Code is the floor. Standard is the ceiling.

Linear lighting is the most exposed material in a luxury interior. A clean reveal reads as architecture; a poor one reads as a defect from across the room. This manual is the working standard for every linear lighting installation Restrepo Innovations and Island Media Systems deliver. It is written for the team that draws the channel, for the electrician who lands the driver, for the drywaller who returns to the reveal, and for the lighting designer who signs the burn-in. One language, one tolerance, one finish.

Hybrid by design: Lutron HomeWorks or Athena for control and scene work, Q-Tran transformers and iQA channel for power and housing. Ketra D4 where tunable color is specified. Hi-Lume Premier where a third-party driver is justified. Every alternate is approved against the same channel, reveal, and commissioning discipline the baseline carries.

HOW TO USE THIS MANUAL

Sections are numbered §01–§13. Each section opens with a kicker, explains the operating principle, lists the standards, and ends with field rules and inspection callouts. Cross-trade boundaries are called out explicitly. The QC gate at the back of the manual matches the gate on the one-page reference card.

CALLOUT LEGEND

FIELD RULE	A non-negotiable rule applied on site, every job.
BEST PRACTICE	Restrepo standard above code minimum. Default unless waived in writing.
DO NOT	Defects we refuse to ship. Pull and rework, no exceptions.
INSPECTION	What the lighting designer or owner's rep checks at QC.
NOTE	Context, citation, or product clarification.
SPECIFICATION	A number, tolerance, or model that must be matched exactly.

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Five parts, thirteen sections, one QC gate. Linked to bookmarks in this PDF.

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PART 1

Operating Principles

Sections 01–03 — mindset, baseline, and what we refuse

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§ 01

Operating Principles

SPEC THE CHANNEL BEFORE THE TAPE

Linear lighting is finish, not wire. Every decision flows from that. The wall, ceiling, or millwork is the housing; the channel is the fixture; the tape is the lamp. If any one of those three is wrong, the other two cannot recover the result. The Restrepo standard locks the channel and reveal at framing, the driver location at rough-in, and the tape and color at the lighting plan. Nothing past that is improvised in the field.

We design every linear run so that drivers can be serviced without demolition, color and dim performance can be commissioned and remeasured years later, and one finished reveal reads as one channel — not as a sequence of patched joints. Reveal geometry drives the framing; framing does not drive the reveal.

The five principles

- Light is finish. Treat the cove like millwork, not like wire.
- Spec the channel before the tape. Reveal geometry drives everything.
- Drivers live where they can be serviced — never sealed in finished millwork.
- Color and dim performance are commissioned and recorded, not assumed.
- One reveal, one channel, one tape per sightline. No mixing on a sightline.

FIELD RULE

FIELD RULE — One sightline, one identity

If a guest standing in the room can see two pieces of linear lighting at once, they must read as the same fixture. Same channel profile, same diffuser, same CCT, same tape reel where practical. Splices fall at corners, never in the middle.

Why upstream decisions own downstream defects

By the time a defect shows up in linear lighting, the cause is almost always weeks earlier. Hot-spotting at 1.5 inches: channel was too shallow. A visible joint mid-wall: the splice was placed on the easiest stud, not the right corner. A driver hum at low dim: a non-Lutron driver got swapped in for cost, off the spec. The fix is not better field carpentry — it is better upstream discipline. This manual is that discipline written down.



BEST PRACTICE

BEST PRACTICE — Mock up before you cut

On any unique mitre, end-cap, or millwork pocket, cut a 12-inch sample before production runs. Hand it to the lighting designer at rough-in, not at trim-out. The cost of a sample is hours; the cost of a re-mitre after paint is days.

§ 02

Approved Platforms — Restrepo Baseline

LUTRON CONTROL, Q-TRAN POWER, KETRA WHERE SPECIFIED

The Restrepo baseline is hybrid by design: Lutron owns the control layer; Q-Tran owns the power and housing layer; Ketra is the color engine where tunable white is in the program. Drivers, tapes, and alternates are approved only when they hold this stack together under one commissioning database.

Control layer

Lutron HomeWorks QSX is the residential default for keypad-driven scene control. Athena is the default where the project mixes large-scale lighting, shades, and HVAC at the system level. Both drive Lutron and Ketra D4 fixtures over the same DIN bus or QS link, which is why the manual treats them as one control surface.

Power & channel layer

Q-Tran transformers and iQA SLIM aluminum channel are the default extrusion and power supply on every Restrepo linear run. The iQA channel is UL-listed when assembled at the factory with the strip and shipped as a single luminaire — that listing is the reason we do not swap in unlisted strip-in-channel combinations on site. The Q6M indoor magnetic AC supply and QZ DC supply round out the higher-load and 0–10 V cases.

Color & driver alternates

Where the lighting plan calls for tunable color, Ketra D4 is the only approved fixture family — its per-lumen color metering is the reason we hold the line on it. Where a third-party driver is justified by the run length or load, Lutron Hi-Lume Premier LTEA series is the approved alternate. Every other driver requires written sign-off before rough-in.

SPECIFICATION

SPECIFICATION — Approved baseline

Control: Lutron HomeWorks QSX or Athena. Color engine: Ketra D4 (tunable). Driver alt: Lutron Hi-Lume Premier LTEA. Power: Q-Tran QTM / Q6M / QZ. Channel: Q-Tran iQA SLIM (factory-assembled with strip). Tape: 24 V, CRI ≥ 95, R9 ≥ 90.



§ 03

Prohibited — Do Not

DEFECTS WE REFUSE TO SHIP

These are not preferences. These are field rules every Restrepo and Island Media crew refuses to break, on any project, regardless of trade pressure or schedule. Every item below is a defect we have seen on someone else's job and inherited the cost of.

- Drivers buried in sealed millwork or above non-removable trim.
- Substituting a different driver brand for the specified one without written direction from the lighting designer.
- Mixing tape reels or batches mid-run on the same sightline.
- 12 V tape on a luxury residential interior linear run, under any circumstance.
- Adhesive-only mounting of LED tape. Mechanical retention is mandatory on every Restrepo run.
- Unfused 24 V outputs on any run longer than 8 ft.
- Splicing tape with solder on a hot-glued joint. Use channel-rated, tinned mechanical connectors.
- Powering RGB or RGBW tape from a non-Lutron-listed driver in a Lutron job.

DO NOT**DO NOT — BX/MC into a sealed cove without written direction**

Running BX or MC into a sealed cove cavity does not, by itself, violate code. It violates Restrepo standard because it forecloses driver service for the life of the building. If a project genuinely requires it, get it in writing from the lighting designer and the GC before rough-in. Default is no.



PART 2

Power & Control

Sections 04–06 — drivers, Q-Tran power, Lutron control

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§ 04

Driver Strategy & Remoting

DRIVERS LIVE WHERE THEY CAN BE SERVICED

Drivers are the single most-likely linear-lighting component to need service in the next twenty years. Every other element — channel, tape, transformer — outlives the driver. The standard for driver location is therefore not 'where it fits' but 'where the next service tech can reach it without a saw.'

Default remoting strategy

Drivers are remoted to a dedicated lighting closet, AV/IT rack, or service panel on the same level as the load they feed. Long runs are permitted only where the V-drop budget tolerates them, documented on the as-built drawing. Lutron Application Note 591 is the governing reference for output-side wiring distances and gauges.

V-drop budget

The Restrepo V-drop budget on the secondary side of any LED driver is 1.5 % maximum, end to end. Above 1.5 %, color shift on tunable-white fixtures becomes visible and dim performance ceases to be predictable. Verify with a meter at the most distant fixture before the lighting designer commissions the scene database.

SPECIFICATION

SPECIFICATION — V-drop $\leq 1.5\%$

Verify per Lutron AN591 and ERP AN110. Pull a service loop of 12 in. minimum at every driver location. Heat dissipation: leave 2 in. minimum air gap between adjacent driver bodies.

Service access is non-negotiable

Every driver location is accessible — never sealed behind drywall without a listed access panel. If the architecture refuses an access panel, the driver moves to the lighting closet. There is no third option on a Restrepo job.

INSPECTION STANDARD

INSPECTION — Driver locations at trim-out

Every driver location verified accessible by hand. Service loop confirmed. Heat dissipation verified by 30-minute burn-in at full output. Driver labeled with circuit, zone, and Lutron address.

§ 05

Q-Tran Power Layer

ONE TRANSFORMER PER ZONE, SIX-PLANE MOUNTING

Q-Tran is the Restrepo default because the listing model survives a long-life residential install: indoor AC supplies are UL 2108 listed for damp/indoor use, the iQA SLIM channel is UL-listed when factory-assembled with the strip, and the same vendor stocks the DC supply line for 0–10 V loads. We do not split power across vendors on a single sightline.

Indoor AC supplies

Q-Tran QTM is the indoor AC default for residential interior linear loads up to its rated wattage. For higher loads — long sightlines, wall-wash arrays, multi-zone runs — Q6M is the next step (500–750 W at 12 V or 24 V). Both mount in any of six planes, which matters in a closet where a code-clearance ceiling forces a side-mount.

DC supplies (0–10 V control)

Q-Tran QZ is used where the control layer is 0–10 V — typically specifier-driven alternates that the lighting designer has signed off on. Output is a clean DC rail; the driver inside the channel still owes the dim performance, so the QZ is sized by load, not by dim curve.

One transformer per zone

Daisy-chaining zones across one transformer is forbidden on any tunable-white run. Color shift between zones becomes locked to load, not to scene, and the lighting designer cannot recover it in commissioning. One zone, one transformer; or one transformer feeding zones that always run together.

FIELD RULE

FIELD RULE — Output wiring

Output: 12 AWG minimum for runs > 10 ft, 10 AWG for runs > 25 ft. Output fused per Q-Tran spec. Inline fuse holder accessible at the driver. Bond transformer chassis per NEC 250.4.



§ 06

Lutron Control Layer

FORWARD-PHASE OR ECOSYSTEM DIGITAL, NO SWITCHING LEGS

On a Restrepo residential job there is no line-voltage at a switch leg for linear lighting. The keypad rides Lutron's QS or DIN bus; the driver gets a constant line-voltage feed and is dimmed digitally or by phase. The cabinet design follows from that: power lands at the driver, not at the wall.

Driver-mode matching

Match the driver mode to the panel: forward-phase or EcoSystem 3-wire digital. Hi-Lume Premier LTEA is forward-phase capable across the Lutron HomeWorks line. EcoSystem fixtures are addressed digitally and do not require a per-zone phase dimmer module.

Ketra D4 fixtures

Ketra D4 fixtures live on a dedicated D4 link from a Lutron processor or DIN-rail D4 hub. No mixing of D4 and QS on the same link. Tunable drivers confirm 0–10 V to D4 rough-in at framing — never as a trim-out improvisation.

Athena keypad-driven scenes

Where Athena is the system, every keypad scene that involves linear lighting is committed to the commissioning database at closeout. The database is delivered to the client as a single PDF and a single Lutron project file. There is no scene tuning over phone or text after closeout — only formal change requests.

NOTE**NOTE — HomeWorks QSX**

Qsx panelized lighting is the residential default. Reference Volume 04 (Building Panel Trim-Outs) for panel mounting and feed standards. Every Lutron driver is labeled with circuit, zone, and address.



PART 3

Tape & Channel

Sections 07–09 — tape, channel geometry, mitres

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§ 07

Tape Selection & Color

24 V, CRI $\geq$ 95, R9 $\geq$ 90

Tape is the only consumable in a linear lighting system. It is also the part the eye sees most directly. The Restrepo standard for tape is therefore conservative: 24 V only, high-CRI only, single reel per sightline, and matched to the Lutron or Ketra driver mode at framing.

Color quality minimums

CRI $\geq$ 95 and R9 $\geq$ 90 are the floor on every interior residential linear run. Below those numbers, skin tones and saturated reds collapse — and the homeowner notices, even if they cannot name it. MacAdam ellipse 3-step or tighter on all runs visible at closeout.

CCT and tunable-white runs

Single-CCT default is 2700 K warm; lighting designer specifies otherwise on the plan. Tunable-white runs are Ketra D4 — do not substitute a 0–10 V tunable tape for D4 on a Lutron job. The color science and metering live in Ketra; nothing else closes that loop.

Single-reel discipline

One reel per continuous sightline. If the sightline is longer than the reel, the splice falls at a corner — never in the middle of a wall, never at eye level on a stair, never above an island where a guest will look up. The lumen output is matched to the channel and diffuser combo, not to the bare tape spec.

SPECIFICATION

SPECIFICATION — Tape standard

24 V only. CRI $\geq$ 95. R9 $\geq$ 90. MacAdam 3-step or tighter. Single reel per sightline. Splices at corners only. Output matched to channel + diffuser combo, not to bare-tape spec.

§ 08

Channel & Reveal Geometry

REVEAL GEOMETRY DRIVES STUD LAYOUT

The channel is the fixture. Every reveal width, return depth, and joint position is decided before drywall is hung — not after. Where a recessed channel meets drywall, drywall returns to the reveal line, never on top of the channel housing. Where a plaster-in channel is used, the plaster laps to the manufacturer's reference line, not over the diffuser.

Channel selection rules

- Channel selected before drywall framing. Reveal geometry drives stud layout, not the other way around.
- Channel depth is at least $1.5 \times$ the tape height. Less depth produces visible hot-spotting on the diffuser.
- Recessed channel: drywall reveal $\geq 1/8$ in. on each side. Drywall must not touch the diffuser.
- Plaster-in channel (PureEdge Reveal, Q-Tran iQA mud-in): mounted to studs/joists per the manufacturer dimension sheet, not to drywall alone.
- Surface channel: backing block in framing. No drywall-only fasteners on any surface-mount channel.
- One channel profile per sightline. Mixing profiles on a continuous run is a defect.

FIELD RULE

FIELD RULE — Reveal width tolerance

Stand at the design eye level before close-in. If the reveal width varies by more than $1/16$ in. along the run, fix it now. After paint the variation is permanent.

Diffuser standards

Frosted (matte) diffuser for cove and toe-kick installations; clear-only when the fixture is concealed and the fixture itself is the visible element. Polarity verified at every connector before final closure. Splice locations documented on as-built so that the next service tech can find the joint without opening a wall.

§ 09

Mitre, End-Cap & Joint Details

45° MITRES, NO BUTT JOINTS ON A SIGHTLINE

Mitres and joints are where linear lighting earns or loses its luxury reading. A 45° external mitre with the diffuser aligned across the joint reads as a single light line. A butt-joint at the same corner reads as two separate fixtures. Tolerances at the diffuser face are tighter than at the channel back, because the eye sees the diffuser, not the housing.

- External corners: 45° mitre. No butt joints visible on a sightline.
- Internal corners: butt joint acceptable; the tape continues across with no visible break.
- End caps: full-depth, color-matched to the channel anodizing. No raw aluminum at termination.
- Channel-to-channel joints: aligned within 1/64 in. on the diffuser face, regardless of housing tolerance.
- Mock-up every unique mitre condition before production cuts — hand a sample to the lighting designer at rough-in.
- Joint between two reels of tape lands at a corner, never in the middle of a sightline.

INSPECTION STANDARD

INSPECTION — Mitres at trim-out

Run a finger along the diffuser at every joint. If you can feel the seam, the eye will see it under low light. Replace before commissioning.



PART 4

Coordination & Service

Sections 10–11 — drywall, millwork, wiring access

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§ 10

Drywall, Plaster & Millwork Coordination

CHANNEL INSTALLED PRE-ROCK, EVERY TIME

Channel rough-in happens before drywall. Drywall returns to the reveal, not over the channel. Painters mask the diffuser slot before primer or the diffuser becomes a permanent record of the prime coat. Plaster-in channels have their own discipline — they are designed to receive plaster, but only to the line specified on the manufacturer dimension sheet.

Drywall coordination

- Channel installed pre-rock. Drywall lead walks the rough-in with the AV/lighting lead before rock goes up.
- Drywall returns terminate at the channel reveal line, not on top of the channel housing.
- Plaster-in channels: plaster lapped to the manufacturer's reference line, not over the diffuser slot.
- Painter masks the diffuser slot with low-tack tape before primer. Tape pulled before final dust cure.
- Any paint or compound on the diffuser is a defect. Replace, do not clean in place.
- Final reveal width verified after paint, before fixture commissioning.

Millwork coordination

Millwork pockets are routed to the channel manufacturer's exact dimension sheet — not to a 'looks about right' overcut. Heat clearance is two inches minimum in clear air space above any driver, regardless of finished millwork. Service access is removable panel or kick-plate at every driver location, every transformer, with no glued-in trim covering a service point.

BEST PRACTICE

BEST PRACTICE — Walk the rough-in

Drywall lead, lighting lead, and electrician walk every channel run together before close-in. One pass catches what three separate trade sign-offs miss.

§ 11

Wiring, Loop & Service Access

STRANDED, CHANNEL-RATED, NO SOLID-CORE ON TAPE FEEDS

Output cabling on the secondary side of an LED driver is stranded, channel-rated, and never solid-core on a tape feed. Service loop is six inches at every driver and every connector. Strain relief is at every cable entry into the channel enclosure, every time. Polarity is verified before final closure on every connector.

- Output cable: stranded, jacketed, channel-rated. No solid-core on tape feeds.
- Service loop of 6 in. minimum at every driver and every connector.
- Strain relief at every cable entry into a channel enclosure.
- Polarity verified at every connector before final closure.
- Splice locations documented on the as-built. No hidden splices.

FIELD RULE

FIELD RULE — As-built captures every splice

If a splice is not on the as-built, it does not exist as far as the next service tech is concerned — and the next service tech will be opening the wrong wall. Document every splice.



PART 5

Closeout

Sections 12–13 — commissioning and specifier alternates

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§ 12

Commissioning & Closeout

BURN-IN 24 H, COLOR-METER, DELIVER THE DATABASE

A linear run is not commissioned until it has burned in for 24 hours at full output, been color-verified with a calibrated meter at every Ketra zone, and survived a dim-curve test at 1, 5, 10, 50, and 100 percent without flicker, no-pop-on, or perceptible color shift. The commissioning database — Lutron project file plus a one-PDF zone report — is delivered to the client at closeout.

Burn-in & metering

- Burn-in: 24 h minimum at 100 % output before scene tuning.
- Color verification with a calibrated meter at every Ketra zone.
- Dim curve tested at 1 %, 5 %, 10 %, 50 %, 100 %. No flicker, no pop-on.
- Lutron commissioning database delivered to client. Backup on file with Restrepo.
- As-built shows every driver location, every channel run, every splice.
- Owner walk-through with scene book before sign-off.

INSPECTION STANDARD

INSPECTION — Closeout package

Lutron / Athena project file. Color-meter readings per zone. As-built. Photo log of driver locations behind every access panel. Scene book signed by owner or owner's rep.

§ 13

Specifier-Driven Alternates

ECOSENSE AND PUREEDGE — ONLY WHEN ON THE LIGHTING PLAN

The Restrepo baseline is Lutron + Q-Tran + Ketra. When the lighting designer specifies an alternate, Restrepo and Island Media install it to the same channel, reveal, and commissioning standard the baseline carries. The alternate is approved when it is on the lighting plan, not when it is mentioned on a phone call.

EcoSense Lighting

EcoSense TROV L60 is approved when on the lighting plan. DMX/RDM control via the system processor. Multi-volt 110–277 V input. Driver remoting per AN591-equivalent — same V-drop budget, same service access discipline.

PureEdge Lighting (Reveal series)

PureEdge Reveal cove and wall-wash systems are approved when on the lighting plan. Confirm Lutron driver compatibility on the spec sheet before order. Plaster-in installation per the manufacturer's dimension sheet — drywall returns to the reveal line, not over the diffuser slot. 24 VDC system, 95+ CRI minimum.

NOTE

NOTE — Substitutions require written direction

Any alternate not on the lighting plan requires written direction from the lighting designer or owner's rep. Verbal approvals do not survive warranty calls. All alternates follow the same channel, reveal, and commissioning standards as the baseline.



APPENDIX A

QC Gate — Verify Before Close-In

Every Restrepo linear lighting installation passes through this gate before the wall closes. The gate matches the QC list on the Linear Lighting Reference Card.

Channel set pre-drywall · reveal verified	Drivers accessible · service panels set
V-drop budget $\leq 1.5\%$ verified	CRI ≥ 95 · single reel per sightline
Mitres mocked-up · joints aligned	Polarity verified at every connector
Burn-in 24 h before scene tuning	Ketra zones color-metered
Commissioning database delivered	As-built matches field exactly

APPENDIX B

Citations & Further Reading

Lutron AN591 — Driver Remoting

V-drop budget and output wiring for Lutron LED drivers.

<https://assets.lutron.com/a/documents/048591.pdf>

Lutron Hi-Lume Premier (369883)

EcoSystem 3-wire constant-voltage LED driver spec.

<https://assets.lutron.com/a/documents/369883.pdf>

Lutron Hi-Lume Premier (3691077)

EcoSystem LED driver typical performance specifications.

https://assets.lutron.com/a/documents/3691077_eng.pdf

Lutron Ketra D4 Spec (3662374)

D4 link, color science, tunable-white commissioning.

https://assets.lutron.com/a/documents/d4r_spec_3662374.pdf

ERP AN110 — Mounting Drivers Remotely

Power supply remoting and thermal considerations.

https://www.erp-power.com/wp-content/uploads/2024/04/AN110_Mounting%20Drivers%20Remotely%20From%20Fixture%20s-1.pdf

Q-Tran iQA SLIM Aluminum Extrusion

UL-listed when assembled with strip at Q-Tran.

<https://www.qtl.lighting>

Q-Tran Q6M Indoor AC Power Supply

Magnetic indoor AC supply, 12 V or 24 V, UL 2108 indoor/damp.

<https://teganlighting.com/wp-content/uploads/2023/06/tegan-lighting-interior-q-tran-600W-12Vmag-spec-sheet.pdf>

EcoSense TROV L60 Linear

DMX/RDM control. 110–277 V input. Approved alternate.

<https://www.ecosenselighting.com>

PureEdge Lighting Reveal Series

24 VDC plaster-in linear systems. 95+ CRI.

<https://www.pureedgelighting.com>

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