

CODE IS THE FLOOR. STANDARD IS THE CEILING.

Scope: Residential outdoor lighting, audio, displays, pergolas/heat, irrigation, and weatherproof power — sequenced, sleeved, and signed before the hardscape pours. Smart-home integration via Crestron Home, Lutron RA3, and Control4. Owner-grade, residential-only, NJ Climate Zone 4A.

\$01	OPERATING PRINCIPLES
- Six-pillar outdoor suite — LV lighting, landscape audio, outdoor displays, pergola/heat, irrigation, and weatherproof power — each a one-shot rough-in discipline; residential-only posture throughout. - Sleeve before stone — all conduit homerun paths, duct bank sleeves, and wire ways installed, photographed, and approved before any hardscape (concrete, pavers, stone, or asphalt) is placed; no corrective access after pour. - Code-first — NEC 2023 Articles 210.8, 225, 300, 411, 640, and 680; NJ UCC NJAC 5:23; UL 1838 (LV landscape lighting), UL 1480 (speakers), UL 1951 (irrigation); IDA DarkSky criteria — these are the floor, not the ceiling. - NJ Climate Zone 4A — 36-inch frost depth (Bergen County north), freeze-thaw cycling November-March, 13°F winter design temperature; all burial depths, backflow specs, and freeze blow-out dates governed accordingly. - Spare hardware ≥5% delivered + labeled — FX Luminaire lamps, Coastal Source connectors, Sonance 70V tap boards, speaker terminals, solenoids, fuses, and controller components included at closeout. - One-line diagram and as-built conduit schedule archived with owner before final payment; Luxor ZD scene archive, Hydrawise schedule backup, and Crestron/Lutron configuration committed to cloud and local media.	

\$02	OUTDOOR LV LIGHTING
- FX Luminaire Luxor ZD/ZDC platform — LZD-150 or LZD-300 transformer (ETL, UL 1838), up to 250 independent zone groups, 0-100% dimming in 1% increments; LZDC versions add 30,000 RGBW color options via ZDC-board fixtures; WIFIMOD2 for iOS/Android app and Crestron Home LAN driver. - Specified fixtures: FX M-PL MosaicPath (IP65, 2.0W/3.6W ZDC, 50,000-hr L70), NP Newport up-light (3LED-9LED, 290-770 lm, 72,000-hr L70), FC FluxColor well light (brass/aluminum, IP rating, 10-year warranty) — all 10-15 V, ETL-listed. - Coastal Source Premier Edition for coastal/salt-air — solid brass, IP68 Plug+Play connectors (IFSCCF/IFSCCM), triple-jacketed cable, LV-300/LV-600 marine transformers; eliminate wire-nut splices in landscape field. - Voltage drop discipline — hub method (not daisy-chain) for 20+ fixture runs; 12 Ga close zone ≤40 ft (≤160 W), 10 Ga mid zone 40-80 ft; multi-tap compensation at 12/13/14/15 V to deliver 10-15 V at fixture; voltage verified under load at each zone. - NEC 411 compliance — listed Class 2 power supply (411.4), output ≤30 V AC, ≤25 A; transformer mounted ≥12 inches above finished grade; supply circuit GFCI-protected per NEC 210.8(A)(3); landscape LV conductors at 30 V or less direct-buried ≥6 inches per NEC Table 300.5 Column 5. - IDA DarkSky compliance — CCT ≤3000K (2700K preferred); full-cutoff or shielded optics on up-lights; Luxor ZD dims to 20-40% output after 10 PM; no light trespass across property lines; ASHRAE 90.2 exterior LPD budget met by FX LED efficacy (36-81 lm/W).	

\$03	LANDSCAPE AUDIO
- Sonance Landscape Series (SLS) primary specification — SLS satellite stakes (IP66, 60° coverage, 70V/8-ohm selectable Laminated Core Transformer), LS12T SUB (12-inch, 22-100 Hz, 300W 70V tap, LDPE enclosure buried per BMK kit), LS15T SUB (15-inch, 20-100 Hz, 94 dB) — Sonance DSP 2-150 MKIII amplifier (150W×2, 473W bridged, 24-bit/96 kHz, SonARC v2 IP control). - Coastal Source Bollard alternative — 10.0 2-Way Ellipse Bollard (rotomolded composite, IP68) and 12.0 Line Source Bollard (12 ribbon tweeters + 6 mid-bass + 10-inch sub, 1,000W, 94 dB, 120° dispersion, 35 Hz-20 kHz) for above-grade architectural integration. 70V vs. 8-ohm decision — use 70V when run length ≥100 ft from amplifier to speaker, zone count ≥3 pairs, or future expansion anticipated; use 8-ohm direct drive for ≤80 ft runs with ≤2 pairs for best fidelity; minimum 14 AWG 4-conductor direct-burial cable for SLS satellite runs. - Satellite geometry — 30-40 ft center-to-center spacing at ear level; angle driver axis 20-30° inward toward primary seating; Sonance BMK sub buried at center of listening area; single LS12T covers ≤2,000 sq ft; single LS15T covers ≤3,500 sq ft when EQ'd through Sonance DSP. - NEC 640 and UL 1480 compliance — Class 3 wiring methods for 70V (≤100W); outdoor speaker cable	

QC GATE — VERIFY BEFORE CLOSE-IN

- ☐ Sleeve red-line photographed — all conduit sleeves under hardscape captured in timestamped photo set before any hardscape is placed; photos labeled by location and system (LV lighting, audio, data, line voltage, irrigation) and filed in closeout archive.
- ☐ Transformer load <80% rated capacity — FX Luxor LZD-150/300 and N66-411 Sonance BMK installed, marked, 70V tap settings performed, and

\$06	IRRIGATION & WATER FEATURE
- Hunter Hydrawise HCC controller — 8-54 stations, two-wire decoder EZ option (IVM decoders), 3.25-inch touchscreen, IP55 outdoor-rated, 2.4 GHz Wi-Fi, UL 1951 listed, 5-year warranty; REST API for Crestron Home driver integration (60-second polling minimum); WR-CLIK wireless rain/freeze sensor (433 MHz, 800 ft range, freeze shutoff at 37°F, 5-year warranty) required on every installation. - Rain Bird ESP-LXIVM two-wire controller for estates 10+ zones — 60-station standard (240-station Pro Panel), 4 two-wire paths, Self-Healing wire fault recovery, FloWatch high/low flow protection, FloManager hydraulic demand management, 8 SimulStations, IQ central control software compatible; decoder burial per NEC 300.5 at 6-8 inches in landscape, 18 inches in hardscape conduit. - Rachio 3 for simpler systems — up to 16 zones, native iOS/Android app, Alexa/Google integration, REST API at developer.rachio.com for Crestron bridge; AC adapter power (DC transformers not supported); Wi-Fi required at controller location; UL 1951 listed. - Backflow preventer code — NJ DCA Bulletin 99-2 and NJAC 7:10-10.3 require testable backflow preventer (RPZ or double check valve per contamination risk assessment) on all irrigation systems; RPZ installed above grade in insulated enclosure for NJ winter survival; permit and inspection required per NJAC 5:23 Plumbing Subcode. - Freeze blow-out protocol — Northern NJ frost depth 36 inches; blow-out performed by October 15 annually or at first sustained below-32°F forecast; 50 CFM compressor minimum for rotary heads at ≤50 PSI; 20-25 CFM for drip zones at ≤30 PSI; 2-3 passes per zone; backflow preventer body blown and insulated; blow-out date and technician logged in service record. - Water feature pump integration — variable-speed pump with 0-10V or BACnet speed control driven from Crestron analog output or relay module; pool-adjacent features comply with NEC 680.26 equipotential bonding and 680.22 GFCI (cross-reference Vol 19 Pool/Spa); dedicated GFCI circuit per NEC 422.31 with accessible labeled disconnect; pump stub-out conduit sized for future VS drive upgrade.	

\$07	WEATHERPROOF POWER
- Outdoor subpanel — NEMA 4 minimum enclosure (IP66) for standard residential outdoor; NEMA 4X 304 stainless (Hoffman CSD30248SS) or 316 SS for coastal sites within 1 mile of salt water; load schedule label on every breaker; mounted on pergola column or dedicated outdoor pad with concrete footing. - Type 1 SPD at outdoor subpanel — NEC 230.67 (2020/2023) mandates SPD at all new service entrances; Square D FSPD140 (140 kA per phase, NEMA 4X) or equivalent Listed Type 1 device installed at the outdoor subpanel feeding all exterior loads; DITEK DTK-MRJOEX (NEMA 4X outdoor, 20 kA/pair, UL 497B) at every PoE-powered outdoor camera or access point endpoint. - GFCI and WR receptacles — all 15/20A 125-250V nonlocking outdoor receptacles listed weather-resistant (WR) and tamper-resistant (TR) per NEC 406.9 and 406.12; extra-duty in-use WP cover (NEC 406.9(B)(1)) at all wet locations; GFCI protection per NEC 210.8(F) on every outdoor outlet circuit ≤150V/≤50A. - Weatherproof enclosure discipline — Stahlin non-metallic FRP NEMA 4X for pool-chemical proximity; all conduit entries maintain original NEMA rating per Stahlin/Hoffman guidelines; intersystem bonding block within 3 ft of outdoor service equipment per NEC 250.94(A); LFNC sealing at conduit entry into heated enclosures from cold exterior to prevent condensation migration. - Generator readiness — Kohler 14RCA/RCAL (14 kW LP/NG, RDC2 controller, OnCue Plus remote monitoring, RXT ATS 100-400A UL 1008) or Generac power inlet box (Model 6338 50A NEMA 3R or 6347 50A corrosion-resistant aluminum) with manual transfer switch per NEC Article 702; NEC 480.10 for any outdoor battery storage (NEMA 3R+ enclosure, ventilation, labeling). - NEC Article 225 outdoor branch circuits — minimum wire size per load; weatherproof fittings at all outdoor boxes; raceway sealed at conduit entry to heated enclosures; outdoor subpanel feeder sized for total connected load plus 25% growth headroom; all outdoor branch circuits on arc-fault or GFCI breakers as required by NEC 210.8 and 210.12.	

\$08	CONDUIT & SLEEVE DISCIPLINE
Red-line duct bank — PVC Schedule 40 conduit(s) encased in minimum 2-inch concrete envelope	

\$10	SMART-HOME INTEGRATION & SCENES
- Crestron Home + Lutron RA3 primary platform — Crestron CP4/MC4 communicates to FX Luxor ZD/ZDC via IP LAN; Lutron RadioRA 3 Processor bridges Cesta keypad button presses to Crestron; Control4 driverCentral modules for Hunter Hydrawise, StruXure Pergola X (HTTP API), and Renson Camargue (IO Homecontrol via Somfy TaHoma bridge); all scenes execute locally on LAN without cloud dependency. - Five locked scenes — • Evening Garden (Luxor ZD at 60%, path + up-lights warm white, pergola closed, audio on, heater off) • Dinner Party (Luxor ZD at 80% RGBW amber, audio up, heater on Hi, pergola half-open) • Watch Party (Luxor ZD at 20%, outdoor TV on, audio to TV zone, pergola closed, heater on Lo) • Storm Lockdown (pergola louvers closed, outdoor TV off, irrigation paused, all circuits confirmed on GFCI) • Winter Off (irrigation controller off/blow-out complete, heaters off, lighting schedule suspended, pergola closed, freeze-protect active). - Lighting scene archive — all FX Luxor ZD/ZDC zone groups, dimmer levels, color values (ZDC), and schedule programs archived in Luxor controller flash memory and exported to cloud backup and USB media; Lutron RadioRA 3 firmware version and keypad button assignments documented in Lutron Designer file archived at closeout. - Irrigation integration — Hunter Hydrawise REST API or Rain Bird IQ software queried by Crestron driver for zone status, schedule, and flow alerts; rain/freeze sensor status displayed on Crestron touch panel; Storm Lockdown scene activates Hydrawise rain delay; API key and endpoint documented in Crestron program notes. - Notification matrix — push alerts for: Luxor transformer GFCI trip, outdoor TV circuit GFCI trip, Hydrawise wire fault, Hydrawise leak/flow alert, freeze sensor trigger (<37°F), Bromic/Infratech heater contactor fault, pergola rain/wind sensor trigger, StruXure/Renson motor stall, and Crestron LAN loss to any outdoor IP device. - Geofencing as secondary trigger only — GPS unreliable in NJ suburban tree cover; Evening Garden scene pre-condition via calendar + sunset-offset timer in Crestron preferred; heater pre-conditioning via scheduled scene, not location; Storm Lockdown triggered by weather forecast integration or manual Cesta keypad hold, not geofence.	

\$11	WITHOUT WRITTEN DIRECTION
- BX/MC cable in direct-buried or hardscape conduit — default to PVC Schedule 40 for all underground and in-slab outdoor wiring; armored cable in any buried or hardscape-encased conduit is without written direction from the engineer of record. - Conduit omitted under hardscape — any line-voltage, audio, data, or irrigation control wiring crossing a hardscape pour without a properly buried conduit sleeve is without written direction; no corrective access after the slab or pavers are set. - FX Luxor transformer supply circuit without GFCI — NEC 210.8(A)(3) requires GFCI on all outdoor 120V receptacles at dwellings; any Luxor or Coastal Source transformer supplied from a non-GFCI-protected circuit is without written direction. - Outdoor TV installed on a shared multi-load circuit — Restrepo Innovations standard is one dedicated 20A GFCI circuit per outdoor display; sharing an outdoor TV circuit with heaters, audio amplifiers, or other loads is without written direction. - Irrigation backflow preventer omitted — NJAC 7:10-10.3 and NJ DCA Bulletin 99-2 require a testable backflow preventer on all residential irrigation systems; omission of the required RPZ or double check valve assembly is without written direction and code non-compliant. - Bonding omitted on metallic outdoor elements within 5 ft of pool — NEC 680.26 requires all metal within the pool bonding zone to be connected to the equipotential bond grid; omission of the bond connection on pergola posts, irrigation pipe, or speaker stakes within the zone is without written direction.	

\$12	PRE-HARDSCAPE & PRE-POUR CHECKLIST
Sleeve red-line photographed — all conduit duct bank sleeves captured in timestamped photo set before any hardscape is placed; photos labeled by location and system (LV lighting, audio, data, line voltage, irrigation) and filed in closeout archive.	

- Pergola footing depth confirmed — column footings founded at 36 inches minimum below finished grade (NJ frost line, Bergen County); conduit stubs plumb and projecting above footing top; electrical rough-in to column base inspected and signed off by AHI before concrete is placed.
- LV landscape lighting conductors ≥30V direct-buried ≥6 inches (NEC Table 300.5 Column 5, UF cable or listed cable); line-voltage and audio speaker cable in Schedule 40 PVC at 18-inch minimum; Class