SECTION 260002

BUILDING ELECTRICAL SYSTEMS

NOTE: It is the intent of this section of specifications to provide assistance in the design and preliminary pricing of this project. This information is based around Module 14 and 15 from the Marriot Autograph Hotel Design Standards dated January 2010 and is subject to revision per final operator choice and subsequent design changes and is not to be included as a part of any lease nor contractual agreement. Copyright - 2016.

I. Project Description

A. The project scope consists of mechanical systems for a hotel. The basic building description is as follows:

1. The building consists of 325-room (keys), 13 floors (ground floor plus 12 guest levels), full service hotel including a three-meal kitchen / dining area with lobby bar, outdoor pool, spa and fitness center, conference rooms and associated support spaces (office and back-of-house). Also, there will be a 550 space free standing parking deck as depicted on the architectural drawings.
2. The total building area is approximately 280,000 sq. ft. (hotel and conference center only)
3. Reference the architectural plans for building configuration and schematic floor plan information.
4. Refer to Marriott's operator's design standards for additional requirements related to the hotel systems. All requirements shall be met unless pre-approved as a deviation.
5. Provide all required interface including but not limited to test and balance, control sequence of operation and verification, testing, etc. for the MEP systems to be commissioned by a third party. All systems shall be set up and verified to function at maximum efficiency, minimizing energy consumption and operating cost.

II. Electrical Service and Distribution

A. Electrical services for the building shall be extended underground from a pad mounted transformer to the main building switchgear. The electrical services shall be 480/277-volt, 3 phase, 4-wire, with one (1) 4000 amp service and (1) 2000 amp service. There will be an additional 300 amp fire pump service. Metering equipment for services shall be installed as directed by the Power Company. Provide a utility service termination cabinet as required. Provide an ethernet output on the switchgear monitoring equipment to be connected to the building EMS.

B. See riser diagrams for more information.

C. All feeders shall be in conduit with copper conductors sized in accordance with Table 310-16 of the 2014 N.E.C. (Service entrance feeders and feeders to the busway tap boxes may be aluminum with compression lugs). All connections to HVAC equipment shall be copper.

III. GROUNDING

A. All grounding shall be in accordance with NEC 250. The main building ground shall be achieved with copper-weld ground rods in an equilateral triangle (6' per side) interconnected with 4/0 bare copper wire. The ground system shall connect to the main switchboard, water

pipes, and building steel. The grounding system shall have a maximum 25 ohms to ground resistance.

B. Provide #4/0 ground riser for the MDF/telephone rooms, with a 2”x12” ground bar in each room.

IV. EMERGENCY POWER FOR THE HOTEL

A. Emergency power shall be supplied using a 500 KW diesel generator with a minimum of 24-hour run time fuel capacity in a skid mounted double wall fuel tank. A 225 amp circuit breaker (life safety) and a 600 amp circuit breaker (standby) shall be located in the generator.

B. The generator shall also provide emergency power to the fire pump through a combination transfer switch/controller and feeder directly connected to the generator.

C. Emergency fixtures shall be located in stairwells, corridors, building exits, lobbies, and toilet rooms.

V. CONNECTION TO EQUIPMENT

A. Provide all power connections to all equipment requiring electrical connection including mechanical equipment, elevators, kitchen equipment, fitness equipment etc. The installation of the power connection shall be in accordance with the manufacturer's recommendations. Provide all starters not furnished under other Divisions.

VI. TELEPHONE SYSTEM

A. The building telephone system shall consist of 2 separate five (5) - 4" underground conduit feeds from the telephone company manhole to the hotel main telephone room in order to provide a diverse route in the event of service interruption. Provide 4' x 8' telephone backboards wrapped around all walls, within each core telephone closet, as shown on the plans. Provide five (5) 4” inter-connecting sleeves extending from the main telephone up through each tower core room. Provide 1 #6 ground to all backboards. Provide five (5) 4” conduits from the main telephone room to the telephone room on Level 2.

B. Provide 208-volt and 120-volt outlets in the hotel main telephone room with six (6) circuits each on emergency power.

VII. LIGHTING

A. Fluorescent strip lighting shall be used in all storage areas and equipment rooms.

B. Fluorescent 2’x4’ recessed troffers shall be used in all back of house corridors, restrooms and offices areas.

C. Provide a $125,000 allowance for all decorative, specialty light fixtures within the building.

D. Provide a $75,000 allowance for all exterior decorative and landscape light fixtures.

E. All fluorescent fixtures shall utilize less than 10% THD electronic ballasts and T8 lamps with 3500K color.

F. Provide complete lighting control system per ASHRAE 90.1.

G. Provide Lutron Graphik Eye 4000 Series dimming system for all public spaces in the hotel, exterior lighting, ballrooms and meeting rooms. Panels to be located in AV room.

H. Exit signs will be edge-lit, L.E.D. type in the public spaces. Exit signs shall be die-cast aluminum LED in the back of house areas.

I. Provide 1'x4', damp location fluorescent, 2-lamp, wrap around fixtures, with zero degree electronic ballasts for outdoor walkway to the parking garage. Fixtures shall be placed 8'-0" on centers and mounted to the bottom of the roof structure in the walkway.

J. Provide site pole light fixtures for roadways. Fixtures shall be Avalon standard fixtures.

K. Provide lighting control panels as shown on the riser diagram.

VIII. LIFE SAFETY SYSTEMS

A. A complete zoned supervised addressable fire alarm and life safety system shall be provided including pull stations, smoke detectors, flow switches, speakers, annunciator panel and control panel. The life safety systems shall comply with all local building codes. When a zoned device is activated, the zone shall be annunciated at the annunciator panel and central control station, all speakers shall sound fire alerting tone followed by an evacuation message, visual alarms shall flash on floor of alarm, floor below, floor above and in stairwells, magnetically held doors shall release, stairwell doors shall receive a signal to unlock, the mechanical systems shall shut down, pressurization fans will activate, and elevators shall drop to the primary discharge level. The fire alarm system shall have battery backup. Smoke detectors shall be provided in mechanical supply and return air ducts, Electrical Room, Mechanical Rooms and elevator lobbies.

B. Provide equipment and conduits in the fire control room per International Fire Code 509.

C. Provide connections to all required components of the smoke exhaust system. Coordinate with division 23.

IX. RECEPTACLES

A. Receptacles shall be of the grounding type. A separate grounding wire shall be required for all convenience outlet circuits.

B. Provide GFI receptacles at the following locations:
1. All outdoor entrances.
2. Cooling tower, dumpster, loading dock, and any other service area.

C. Provide a 120v GFI weather proof receptacle and a 208v weather proof receptacle on all four sides of the building for window washing equipment.

D. Provide normal convenience outlets in core rooms and elements.

E. Emergency outlets shall be provided in the following area:
1. All electrical rooms.
2. All telephone rooms.
3. Fire control room.

4. At the emergency generator.
5. The security desk.

F. Provide three (3) 120 Volt circuits in each guest room.

G. Provide outlets in guestrooms as directed by interior designer. One (1) 120 volt, 20 amp dedicated duplex receptacle shall be provided adjacent to the vanity in each guestroom bathroom.

H. Provide 120-volt connection to low voltage transformer for automatic flush valves in the public areas.

I. The guest units shall be provided with an Intelligent Hotel Guest Room Control System capable of triggering an "occupied" room state. The sensors shall detect occupancy and set selected light fixtures to dim/brighten automatically to reduce energy. Provide a front end for hotel employees to access all required interface. Basis of Design, Inncom as set forth by Marriott guidelines.

J. For Meeting Rooms/Ballroom:
1. In general, provide one (1) 120-volt, 20 amp receptacle every 25 ft., with a maximum of two (2) receptacles per 20 amp circuit.
2. For meeting rooms that are < 800 sq. ft. provide:
   a. One (1) 120-volt, 20 amp receptacle every 15 ft., with a maximum of two (2) receptacles per 20 amp circuit.
   b. One (1) 208-volt, 1-phase, 60 amp twist-lock receptacle on the service wall.
3. For meeting rooms that are > 800 sq. ft. provide:
   a. One (1) 120-volt, 20 amp, dedicated receptacle every 15 ft.
   b. One (1) 208-volt, 3-phase, 60 amp twist-lock receptacle on the service wall.
4. For meeting rooms that are > 1500 sq. ft. provide:
   a. One (1) 120-volt, 20 amp, dedicated receptacle every 15 ft.
   b. Two (2) 208-volt, 3-phase, 60 amp twist-lock receptacles on the service and entry walls.
5. For meeting rooms that are > 5000 sq. ft. provide:
   a. One (1) 120-volt, 20 amp, dedicated receptacle every 15 ft.
   b. One (1) 208-volt, 3-phase, 60 amp twist-lock receptacle in each Salon on the back wall with decorative cover.
   c. One (1) 2' x 2' x 2' floor box centrally located with four (4) 3" conduits stubbed up to the service aisle or adjacent electrical room for additional power and voice/data runs.
6. For rooms that are > 10000 sq. ft. provide:
   a. One (1) 120-volt, 20 amp, dedicated receptacle every 15 ft.
   b. One (1) 120-volt, 20 amp receptacle located to match hang point grid above ceiling with access.
   c. One (1) 208-volt, 3-phase, 60 amp twist-lock receptacle in each Salon on the back wall with decorative cover.
   d. One (1) 208-volt, 3-phase, 4-wire, 400 amp service disconnect located in the service aisle with pass through for cables.
   e. One (1) 2' x 2' x 2' floor box centrally located with four (4) 3" conduits stubbed up to the service aisle or adjacent electrical room for additional power and voice/data runs.

7. For each of two (2) large ballroom sections, provide one (1) 120/208-volt, 3- phase, 4-wire, 200 amp disconnect with pin and sleeve cable receptacle.

X. CODES

A. The electrical installation shall conform with the 2014 National Electrical Code, all local codes and laws, and the industry standards for good workmanship.

XI. SECURITY

A. Provide a conduit system for keypad/card readers at all exterior doors and security sensitive areas. Provide a junction box at 48" AFF with a 3/4" conduit routed to a junction box in the security office at the loading dock.

B. Provide a conduit system for cameras at all exterior doors and security sensitive areas. Provide ¾" conduits routed to security office at the loading dock. There will be one (1) camera at each entrance and two (2) at the loading dock.

C. Provide one (1) 4" conduit from the parking garage electrical area to the communications room. This conduit is to serve the card access (security) in the parking garage.

XII. SITE CONDUIT INFRASTRUCTURE

A. Provide one (1) 2" conduit from transformer vault to main telephone room for use by Power Company.

B. Provide one (1) 1" conduit from transformer vault to each switchboard.

C. Provide two (2) 2" conduits from main telephone room to outside building line. Label as future communications.

D. Provide two (2) 4" conduits from the building to property line for the hotel. Label as CATV. Conduits shall be routed to the hotel telephone room on the main level.

E. Provide two (2) 4" conduits from main telephone room to property line. Label as fiber optic.

F. Provide one (1) 1" conduit from the generator to the fire control room for generator controls.

XIII. MISCELLANEOUS

A. Provide one (1) 4" conduit from each elevator machine room to fire control room.

B. Provide power connections to all building signs.

C. Provide a master label lightning protection system.

D. Provide a telephone line in conduit to each elevator.

E. Provide a Current Technologies SL3-250 SPD device for each main switchboard. SPD shall be mounted external to the main switchboards. Provide a Current Technologies CG-150 SPD for each emergency panelboard.

END OF SECTION 260002

SECTION 260100

ELECTRICAL GENERAL

PART 1 - GENERAL

1.1 SCOPE

A. Division 26 includes all Specifications in the 260000 Series and the accompanying Electrical Drawings. Provide all labor, materials and equipment, and all necessary operations to provide the complete scope of the electrical systems intended under this Division. Division 26 is not a standalone document, but a part of the complete Project Documents.

B. Attention is called to the fact that there are many interfaces between the work required in this Division and the work required in other Divisions. Provide the necessary interface and coordination with other Divisions to provide a complete project.

1.2 CODES AND REGULATIONS

A. All work under this Division shall comply with all local building codes, laws, regulations, ordinances and the requirements of the 2014 National Electrical Code.

B. Where conflicts of installation requirements occur between the aforementioned codes, regulations or the Contract Documents, the most restrictive shall govern.

C. Obtain all permits and licenses and pay all fees required by local authorities. Arrange for all necessary inspections required by the authorities having jurisdiction and provide written certificates of approval to the project Owner or his designated representative.

1.3 DEFINITIONS

A. Contract Documents: The complete set of project Drawings and Specifications.

B. Provide: Furnish, install and connect.

C. Work: All materials installed, including all labor to provide complete system.

D. Wiring or Wired: All wire or cable installed in conduit from panelboard to equipment and connected at both ends with all required boxes, connectors, couplings, etc.

E. Conduit: Rigid steel conduit intermediate metal conduit (I.M.C.), electrical metallic tubing (EMT) plastic conduit (PVC), or flexible steel conduit.

1.4 DRAWINGS AND SPECIFICATIONS

A. The Drawings and Specifications together are to be considered as the Contract Documents. Any work shown in one and not shown in the other, or implied by either, shall be provided to give a complete project.

B. Should any conflicts exist between the Drawings and Specifications or there is an item

shown/called for which is not clearly defined, immediately submit a request for clarification. No additional monies will be granted later when a conflict is resolved or an item is more clearly defined.

C. The Drawings are schematic and are not intended to show the exact location outlets, etc. or the routing of conduit.

D. The exact location of equipment requiring electrical connections (mechanical equipment, elevators, lights, etc.) shall be as located by other Divisions of the Contract Documents. Refer to the Architectural, Structural and Mechanical Documents for dimensions and details of building construction and provide work described in this Division so that it conforms to the details of the project. The right is reserved to relocate any receptacle, switch or other outlet a maximum of 10'-0" before it is permanently installed without incurring additions to the Contract amount.

1.5 SITE VISIT

A. Visit the site and become familiar with all aspects of the site and existing conditions before submitting Contract price.

B. No allowance will be made for lack of knowledge of existing conditions.

1.6 DEVIATIONS

A. No deviations from the Contract Documents shall be made without the full knowledge and written consent of the Architect.

B. If the existing conditions make it desirable to modify the Contract Documents in regard to any item, provide a written request to the Architect.

PART 2 - PRODUCTS

2.1 STANDARDS FOR MATERIALS AND WORKMANSHIP

A. All materials used shall be new and shall be stamped with the label of Underwriters Laboratories, Inc. (UL).

B. All materials shall meet the standards of the following associations and institutes where applicable:
1. National Fire Protection Association (NFPA)
2. American Society of Testing Materials (ASTM)
3. American National Standards Institute (ANSI)
4. National Electrical Manufacturer's Association (NEMA)
5. Institute of Electrical and Electronic Engineers (IEEE)

C. Manufacturer’s names and catalog numbers specified herein are intended to describe the material and set the standard of quality. All bids shall be based on material specified. Requests for approval of material not specified shall be considered if the request is in written form and submitted to the Architect no later than fourteen (14) days before bid date. All requests shall conform with the provisions of the general and supplementary conditions.

D. Samples of materials requested to be substituted shall be furnished upon the request of the Architect.

2.2 SHOP DRAWINGS AND SUBMITTAL

A. The Engineer's review of shop drawings or submittals is a cursory review to check for general compliances of submittals with the design intent of the Contract Documents. The Engineer's review does not relieve the Contractor of his responsibility of complying with the Contract Documents. All coordination of the work in strict compliance with the Contract Documents is the sole responsibility of the Contractor.

B. The following items shall be submitted for review:
1. Conduit and wire
2. Grounding system
3. Devices
4. Coverplates
5. Metering equipment
6. Panelboards
7. Switchboards
8. Transformers
9. Fuses
10. Overcurrent devices
11. Busway
12. Ground fault system
13. Disconnect switches
14. Lighting fixtures
15. Lighting control system
16. Dimming system
17. Life safety system
18. Emergency system
19. Motor starters
20. Motor control center
21. Transient Voltage Surge Suppression

C. All shop drawings and submittals shall be submitted in compliance with the requirements of the general and supplementary conditions. No more than four (4) copies of submittal data will be reviewed. Any additional copies will be returned unmarked. The responsibility of copying review comments on any additional copies will rest solely with the contractor.

D. All submittals shall bear the name of the manufacturer to be used.

E. All shop drawings and submittals shall include a stamped indication signifying that the submittal has been reviewed for compliance with the Contract Documents by the Contractor. This stamped indication also represents the fact that the Contractor has checked this submittal for its interaction with all other Divisions and certifies by his signature or initials that all coordination has taken place. The stamp shall include the date, name of the Contracting Firm, the signature of the Contractor, certification of compliance and approval. This stamp shall be on the submittal before the Engineer will review it.

F. The engineer will review an individual submittal not more than twice. If the submittal is rejected again on the second review, the contractor will bare all responsibility for paying for the engineer's time for additional reviews. Such payments to the engineer shall be withheld from the next monthly pay application.

2.3 RECORD (AS-BUILT) DRAWINGS AND MAINTENANCE MANUALS

A. At job completion, submit to the Architect, a set of mylar sepias showing all deviations from the Contract Documents. The Drawings shall also have dimensions locating all underground conduits.

B. At job completion, submit to the Architect, three (3) sets of maintenance and instruction manuals for all equipment furnished on the project.

PART 3 - EXECUTION

3.1 COORDINATION

A. Coordinate all space requirements with all other Divisions before installing any work. Install work such that adequate space will be allotted for all other work from other Divisions to be installed and also will allow room for future access for repair and maintenance.

B. Any work installed without proper coordination shall be relocated at the Architect's direction without increasing the Contract price.

C. During the bidding process or the pricing for a guaranteed maximum price, coordinate with all other Divisions for the total amount of work required in Division 26. Any work shown or implied in another Division requiring work in Division 26 shall be included in the Contract price regardless of whether or not it is addressed in Division 26.

3.2 PROTECTION OF MATERIALS

A. All equipment shall have the original finish when the building is turned over to the Owner.

B. Protect equipment during construction from dirt, water, chemical, mechanical damage, etc. Protect all conduit openings so that no foreign material will enter the conduit.

3.3 TESTS, DEMONSTRATION AND INSTRUCTIONS

A. Test all systems described in this Division in the presence of the Owner or a designated representative upon completion of the work. Demonstrate that the installation is in accordance with Contract Documents.

B. Any work found not to be in compliance with the Contract Documents shall be repaired or replaced without incurring any additions to the Contract price.

C. Provide to the Owner, all instruction on maintenance and operation of all systems and equipment provided under this Division. Provide all necessary tools and personnel to thoroughly present these instructions.

3.4 GUARANTEE

A. All systems, equipment, components, work, etc. provided under this Division shall be covered by a one year guarantee starting at the time of final acceptance of the work by the Owner. Any defects in the work, systems, equipment or components found during this year shall be corrected at no charge. The guarantee shall include providing all necessary cutting, patchwork, repainting, etc. to make the work complete and new.

B. Present this guarantee and any additional warranties or guarantees on furnished equipment or systems to the Architect. All equipment or system guarantees are in addition to the general guarantee.

END OF SECTION 260100

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SECTION 261000

ELECTRICAL BASIC MATERIALS & METHODS

PART 1 - GENERAL

1.1 DESCRIPTION

A. All work specified in this Section shall comply with the provisions of Section 260100.

B. This Section describes the basic electrical materials and installation methods that are acceptable and applicable to Division 26.

PART 2 - PRODUCTS

2.1 CONDUIT

A. Galvanized rigid steel conduit shall be low carbon, hot-dipped galvanized both inside and out with threaded joints.

B. Intermediate metal conduit (IMC) shall be steel, galvanized both inside and out with threaded joints.

C. Electrical metallic tubing (EMT) shall be steel, galvanized both inside and out.

D. Plastic conduit (PVC) shall be schedule 40 PVC heavy wall type. A grounding conductor shall be provided.

E. Flexible metal conduit shall be flexible steel conduit tubing and shall meet Underwriters Laboratories Standard for Flexible Steel Conduit.

F. Liquid-tight flexible metal conduit and liquid-tight non-metallic conduits shall be liquid-tight and sunlight resistant.

G. Steel conduit approved manufacturers are Allied, Triangle and Republic.

H. PVC conduit approved manufacturers are Carlon and Triangle.

2.2 CONDUIT FITTINGS

A. Rigid conduit and IMC conduit fittings shall be zinc-coated, ferrous metal and taper threaded type.

B. EMT fittings shall be zinc-coated steel and hexnut compression or set-screw type. EMT connectors shall have insulated throats.

C. PVC fittings, elbows and cement shall be produced by the same manufacturer. All joints shall be solvent welded in accordance with the manufacturer's recommendations.

D. Conduit connections to switchboards, motor control centers, transformers, panel cabinets, and pull boxes shall have grounding wedge lugs between the bushing and the box or locknuts designed to bite into the metal.

E. Each conduit end shall be provided with either an insulated throat connector or separate locknut and insulated bushing. Bushing shall be installed before any wire is pulled.

F. Conduit fittings approved manufacturers are Raco, Steel City, O.Z. Gedney, Thomas & Betts and Appleton.

G. Expansion fittings shall be provided in all conduit which crosses and expansion joint.

2.3 CONDUCTORS

A. Conductors shall be copper of 98% conductivity, 600 volt insulation. Sizes specified are AWG gauge for No. 4/0 and smaller and circular mils (MCM) for all sizes larger than no. 4/0. Conductors No. 10 and smaller shall be solid and type "THHN" or "THWN" insulation. No. 8 and larger shall be stranded and type "THW" or "XHHW" insulation. Aluminum conductors shall be Alcan 8000 series, Stabiloy or approved equal. All conductors to mechanical equipment shall be copper.

2.4 OUTLETS

A. Outlet boxes and covers shall be of such form and dimensions as to be adapted to their specified usage, locations, size and quantity of conduit, and size and quantity of conductors entering the boxes. In special "Fire Rated" partitions, outlets shall comply with ASTM No. E119.

B. Flush ceiling outlets for surface or pendant mounted lighting fixtures shall be one-piece 4" square or octagonal pressed steel boxes. Boxes for devices in unfinished masonry walls or stud walls shall be pressed steel, square corner, sectional switch boxes, or shall be 4" square box with a square cornered tile wall cover, set flush with masonry construction. Boxes in concrete ceiling slab shall be octagonal, shallow concrete boxes. Welded boxes are not acceptable.

C. All outlet boxes in plaster or masonry walls or ceiling shall be provided with plaster rings.

D. Junction boxes and all outlets not indicated as containing wiring devices or lighting fixtures shall have covers. Covers for outlets in walls shall be as specified for wall switches and receptacles.

E. Outlet boxes exposed to the weather and outlet boxes for vaportight lighting fixtures and devices shall be of cast iron corrosion resistant type.

F. Outlet box approved manufacturers are Appleton, Raco, Steel City or Crouse-Hinds.

2.5 DISCONNECT SWITCHES

A. Disconnect switches shall be "heavy-duty" type, enclosed switches of quick-make, quick-break construction. Switches shall be horsepower rated for 600 volts AC as required. Lugs shall be UL listed for copper and aluminum.

B. Padlocking provisions shall be provided for padlocking in the OFF position.

C. Switches shall be furnished in NEMA I General purpose enclosure unless noted otherwise. Switches located on the exterior of the building or in "wet" locations shall have

NEMA 3R enclosures.

D. Fused disconnect switches shall have rejection type fuse clips with dual element, current limiting fuses of rating shown.

E. Disconnect switches shall be mounted to structure. Disconnect switches shall not be mounted to mechanical equipment or ductwork.

2.6 NAMEPLATES

A. Nameplates shall have 3/8" high engraved letters.

B. 120 or 208 volts: white core laminated bakelite with black finish.

C. 277 or 480 or higher volts: black core laminated bakelite with white finish.

D. Emergency power: white core laminated with red finish.

2.7 WALL SWITCHES

A. Wall switches shall be plastic, totally enclosed, quiet type, self-grounding, 277 volts and 20A rating and shall match existing if possible and equal the following:

Single Pole: Hubbell No. CS1221, or equal by Leviton, P&S or Cooper.

Double Pole: Hubbell No. CS1222, or equal by Leviton, P&S or Cooper.

Three-Way: Hubbell No. CS1223, or equal by Leviton, P&S or Cooper.

Four-Way: Hubbell No. CS1224, or equal by Leviton, P&S or Cooper.

B. Guestroom wall switches shall be Lutron Lynco LX-1PSL or approved equal.

C. Color shall be as selected by architect.

D. Flush motor switches with red pilot light and with overload protection for fractional horsepower motors shall be Hubbell No. HBL1221PL.

E. Key switches shall be Hubbell No. HBL1221L 20A Series or approved equal by P&S or Leviton.

2.8 RECEPTACLES

A. Duplex receptacles shall be Decora style plastic, two-pole, three wire, self-grounding, side wired, 125 volts and 20A rating and shall match existing if possible and be equal to the following: Duplex receptacles shall be Hubbell No. DR20 Series, Leviton No. 16532-T Series or Bryant DR520 Series. Isolated ground type shall be Hubbell No. IG-20DR Series or Bryant 9300-IG Series.

B. Single receptacles shall be two-pole, three wire, self-grounding, side wired, 125 volts and 20A rating and shall be equal to the following: Single receptacles shall be Hubbell No. HBL5361 Series, or equal by Leviton, P&S or Cooper. Isolated ground type to be Hubbell

No. IG-5361 Series, or equal by Leviton, P&S or Cooper.

C. Ground fault circuit interrupt (GFI) receptacles shall be Hubbell GFR5352, or equal by P&S, Leviton or Cooper.

D. All receptacles in guestrooms shall be tamper resistant (except for the bathroom vanity GFI receptacle).

E. Color shall be as selected by the Architect.

2.9 COVERPLATES

A. Coverplates for flush mounted devices shall be brushed finished stainless steel standard size, Hubbell “P” Series or equal by Leviton, P&S or Cooper.

B. Telephone outlet coverplates shall have same finish as above and have a bushed hole in the center.

C. Coverplates for exterior devices shall be self-closing, die cast aluminum Hubbell WP8M or equal by Leviton, P&S or Cooper.

2.10 PLYWOOD BACKBOARDS

A. Provide plywood backboards where shown. Backboards shall be minimum 3/4" thick and sized as shown or to accommodate equipment indicated to be mounted thereon.

B. Secure plywood to the building structure and paint with two coats of gray paint.

2.11 SMOKE AND FIRE STOP FITTINGS

A. Smoke and Fire Stop Fittings shall be UL listed for that purpose. The fittings used to seal conduit either on the outside of the conduit, busway or cable or internally shall have heat activated intumescent material, which expands to fill all voids. Smoke and fire stop fittings shall be O.Z./Gedney "FIRE-SEAL" or Dow Corning silicone RTV foam with an hourly fire-rating equal to or higher than the rating of the floor, ceiling or wall through which the cable or conduit passes. The seals for conduit shall be of the flanged type.

2.12 FLOOR OUTLETS

A. Floor outlets shall be single gang floor boxes, Hubbell B2436 Series, complete with cast iron body, vertical angular adjustment, brushed brass frame, brushed brass floor plate and gasket. Larger than standard tappings shall be furnished where required. Adjacent boxes shall be installed on minimum 7" centers.

B. Duplex floor receptacle outlets shall have Hubbell No. S3825 floor plate, a No. SB3083 carpet plate where installed in carpeted floor and a Hubbell CR5262 Series duplex receptacle. Single floor receptacle outlets shall have a S2625 plate and Hubbell single receptacle. Equal manufacturers shall be Leviton, P&S or Cooper.

2.13 FUSES

A. Provide all fuses. All fuses shall be of the same manufacturer. All fuses shall be of the

high interrupting rating (200,000 Amps), current limiting type and manufactured by Bussmann. Fuses shall be provided for each fuse cutout and the specified quantity of fuses shall be furnished for spares.

B. Circuits 0 to 600 ampere shall be protected by rejection type, current limiting BUSSMANN LOWPEAK Dual Element Fuses LPN-RK (250 volts) or LPS-RK (600 volts). All dual-element fuses shall have separate overload and short-circuit clearing chamber. The fuse must hold 500% of rated current for a minimum of 10 seconds and be listed by Underwriter's Laboratories, Inc., with an interrupting rating of 200,000 amperes RMS symmetrical. The fuses shall be UL Class RK-1.

C. Circuits 601 to 6000 ampere shall be protected by current limiting BUSSMANN HI-CAP Time-Delay Fuses KRP-C. Fuses shall employ "O" rings as positive seals between the end bells and the glass melamine fuse barrel. The terminals shall be opened. Fuses shall be time-delay and must hold 500% of rated current for a minimum of 4 seconds, clear 20 times rated current in 0.1 seconds or less and be listed by Underwriter's Laboratories, Inc., with an interrupting rating of 200,000 amperes RMS symmetrical. The fuses shall be UL Class L.

D. Furnish and turn over to the Owner a minimum of one (1) set of spare fuses (set consisting of three fuses) for each type and rating of fuse used. When the number of fuse sets of the same type and rating actually installed exceeds five (5) sets, furnish an additional spare set of fuses for each five (5) or fraction thereof.

E. Provide a cabinet in which to store all spare fuses, Bussman Catalog No. SFC

F. Acceptable manufacturers are Bussman or equal by Littlefuse.

PART 3 - EXECUTION

3.1 CONDUIT

A. Rigid steel (or IMC) shall be used for service entrance and all feeders and branch circuits where exposed to damage.

B. EMT shall be used for branch circuits, fire alarm and telephone when not underground or in concrete in contact with the earth.

C. Schedule 40 PVC may be used for all underground feeders, service entrance conductors when encased in 4" of concrete on all sides, or under the lowest floor slab.

D. Conduit shall be continuous from outlet to outlet, from outlet to cabinet, junction box and pull box. Conduit shall enter and be secured to all boxes, etc., in such a manner that each system will be electrically continuous from service to all outlets such that a good ground is provided. All conduit from cabinets and junction boxes shall terminate in approved outlet boxes or conduit fittings. Conduit connections to any box which has no threaded hub shall be double locknutted.

E. Provide junction boxes or pull boxes where shown and where necessary to avoid excessive runs or too many bends between outlets. The conduit sizes shown may increase if desired to facilitate the pulling of cables.

F. All conduit shall be concealed unless indicated otherwise. Install exposed conduit parallel with or at right angles to the building walls and support from walls or ceilings at intervals required by Code with approved galvanized iron clamps or hangers. Concealed conduit above the ceiling shall be supported independent of ceiling construction. Where ceilings of lay-in type are used, conduit must be installed high enough to permit removal of ceiling panels and lighting fixtures. Use threaded rods and hangers for supporting single conduit. Use trapeze hangers consisting of double-nutted threaded rods and "Unistrut" channels or angles of 12 gauge minimum steel for supporting multiple conduit.

G. Minimum size conduit for branch circuits shall not be smaller than 1/2". Home runs shall extend from outlets shown to panel designated. Home runs shown shall not be combined. Home run conduit shall not be smaller than 3/4".

H. At couplings, conduit ends shall be threaded so that they meet in the coupling. Right and left hand couplings shall not be used; conduit couplings of the Erikson Type shall be used at locations requiring such joints.

I. All conduit for future use, for telephone wire, or for data communication cable, shall be left with No. 16 gauge wire pulled in them or a pull line as manufactured by Ideal, and the ends securely corked or capped.

J. Expansion fittings shall be installed in all conduit which pass through the cross-sectional area of expansion joints.

K. Provide non-hardening elastic type duct seal compound, Neer No. DC., 3M Co. "Scotchfil", or Gardner Bender duct seal, for each conduit entering the building from outside and for each conduit passing from one space into another which is normally at a lower temperature.

L. Provide watertight conduit hubs on conduit terminating in a box or cabinet exposed to the weather.

M. Space in sleeves or around conduit that pass through fire resistive or fire rated walls, partitions, floors or ceilings shall be closed by packing with an unlabelled fire resistive material that will maintain the rating of the barrier penetrated.

3.2 FLEXIBLE CONDUIT

A. PVC extruded cover flexible conduit shall be used in making short flexible connections to rotating or vibrating machinery or equipment. The flexible conduit at these locations shall be as short as possible, but shall have a minimum length of 12".

B. A green stranded bonding jumper shall be installed outside of all flexible conduit that extends directly from a non-flex conduit to a rotating or vibrating machine. Where a junction box is used, the green stranded bonding jumper shall be installed inside the flexible conduit and attached to the junction box and to the machine. When the bonding jumper is installed outside of the flexible conduit, plastic wire straps shall be used 6" o.c. to secure the jumper to the flexible conduit.

C. Flexible metal (MC) conduit system may be utilized where concealed in walls and/or millwork only. MC Cable shall run from point of exit from wall or millwork to nearest structurally support junction box. MC cable will not be permitted to be installed in the

above ceiling space and shall not pass through a fire rated partition. Conductor colors of the MC cable shall comply with 16100 3.04 C

3.3 CONDUIT PROTECTION

A. All conduit installed in the ground outside the building exterior line (with the exception of exterior lighting circuits) shall be encased in 4" of concrete on all sides. Concrete shall be a minimum of 3000 P.S.I. mix. All threaded joints in rigid conduit that is encased in concrete shall have a U.L. listed joint compound applied. All conduit installed outside the building underground shall be buried a minimum of 30" below finished grade but in no case shall be buried deeper than 48". Where conduit is installed below the ground floor slab inside the building exterior line, the conduit shall be run between the floor slab and the vapor barrier. These conduits shall be installed in the slab itself where feasible. When a conduit duct bank must be installed then the entire duct bank shall be encased in concrete and installed per Appendix B of the NEC. Derating of conductors in the underslab duct bank shall be the responsibility of the contractor. Conduit installed in any slab, where permitted above, shall be above the bottom steel and below the top steel.

B. Conduit shall be secured in place and protected where necessary to prevent damage to work during construction. The ends of all conduit shall be plugged to avoid filling with any foreign matter. All conduit shall be blown out and swabbed clear of water and trash prior to pulling wire.

C. Provide identifying marker tape the entire length of each conduit installed in the ground outside the building. The tape shall be constructed of inert polyethylene, resistant to acids, alkalis, etc., in the soil, and shall be a minimum 4 mil thickness. The tape shall be yellow, 6" wide, and shall have the words, "CAUTION - ELECTRIC LINE BURIED BELOW," imprinted with contrasting permanent ink. The imprint shall repeat itself for the entire length of the tape. The tape shall be buried at a maximum of 18" below finished grade, above a portion of the earth fill shall be "Terra Tape" as manufactured by Reef Industries, Inc., P.O. Box 33248, Houston, Texas 77033 (1-800-231-6074).

D. All conduit installed from the power company vault to the main switchboard and fire pump shall be encased in a minimum of 4” on concrete.

3.4 WIRING

A. All conductors shall be installed in conduit. No conductors shall be pulled into the conduit until the conduit system is complete and plaster had dried. Wire pulling lubricants shall be Gardner-Bender "Wireaide" or Ideal "Yellow 77".

B. Conductors shall be continuous from outlet to outlet and from outlet to junction box or pull box. All splices and joints shall be carefully and securely made to be mechanically and electrically solid with pressure type connectors, Gardner Bender "Winggard" or Ideal "Wingnut". Tape shall be "Scotch" No. 33 for indoor and No. 88 for outdoor or Gardner Bender No. 95-661. Where connection is made to any terminals of more than 30 amperes capacity and where conductors larger than No. 10 are connected to any terminal, copper terminal lugs shall be bolted to the conductors. Where multiple connections are made to the same terminal, individual lugs for each conductor shall be used. Aluminum conductors, if used for service conductors, shall be made with high compression lugs as manufactured by Square D, Ideal or MAC.

C. Each conduit shall have a minimum of two (2) conductors pulled in unless that particular conduit is noted as being for systems other than electrical circuitry and/or future use or unless noted otherwise.

D. Conductors for lighting and receptacle circuits shall have color coded jackets. The wiring shall be color coded with the same color used with its respective phase through the entire job as follows:

208/120 Volt System	480/277 Volt System
Phase A - Black	Phase A - Brown
Phase B - Red	Phase B - Orange
Phase C - Blue	Phase C - Yellow
Neutral - White	Neutral - Gray
Ground - Green	Ground - Green

E. The feeder and service entrance conductors shall be color coded by the use of colored plastic tape applied within 6" of each conductor end.

F. Branch circuit conductors shall not be smaller than No. 12 and where the home run from center of load exceeds 100'-0", the conductors from home run outlet to panel shall be No. 10 minimum.

G. For branch circuits terminating in outlet without device, leave minimum of 12" of slack wire coiled for connection of equipment. All conductors shall be identified with proper circuit numbers at terminals, junction boxes at panelboards within 6" of conductor ends.

3.5 OUTLETS

A. Provide galvanized steel or cast type boxes for all outlets.

B. Where outlet boxes are used to support lighting fixtures, the outlet box shall be anchored to the structural members of the building per NEC 370-13.

C. Outlet boxes shall be flush mounted unless they are specifically shown as being used with exposed conduit or are located above a ceiling.

D. Where outlets are supplied from conduit run in or below floor slabs, the conduit shall be stubbed up at the location shown and the wall built up around the conduit.

E. Cuts for outlet boxes in masonry walls shall be made so that the coverplate will completely cover the cut. The mounting height of switch, receptacle and other outlets may be varied slightly, with the Architects approvals, so that the outlet box, top or bottom, will occur at a masonry joint.

F. The edge of all outlet boxes shall be flush with the surface in which they are recessed. The devices that fit into the outlet boxes shall be screwed tight before the coverplate is installed and the coverplate shall not be used as a means of tightening the devices in place.

G. Where outlets are shown as being adjacent and different mounting heights are specified for each, they shall be mounted one directly over the other, on the centerline of the group.

3.6 NAMEPLATES

A. Provide specified nameplates on the main switchboard, distribution panels, feeder switches, feeder breakers, panelboards motor control centers, disconnect switches, contactors, starters, transformers, start-stop push buttons and motor switches.

B. Provide nameplates on every device in the main switchboard, distribution panels and motor control centers.

C. Nameplates for surface mounted equipment shall be installed on the exterior of equipment with sheetmetal screws. Nameplates for flush or recessed mounted equipment shall be installed on the inside of the panel door or cover with epoxy cement.

3.7 WALL SWITCHES AND RECEPTACLES

A. Where more than one device is indicated at a location, the devices shall be gang-mounted in combined multi-gang boxes and covered jointly by a common coverplate. Provide barriers as required by the devices and voltages being used.

3.8 COVERPLATES

A. All junction boxes, outlet boxes, multi-gang switch boxes, utility boxes, etc., shall be covered with a coverplate. The coverplate shall be a finished plate as specified unless designated otherwise.

B. Coverplates shall be mounted vertically unless designated otherwise.

3.9 GROUNDING

A. Ground connections shall be in accordance with the 2014 National Electrical Code.
   1. Provide a grounding electrode system consisting of a minimum of three (3) copperweld rods, 3/4" x 10'-0", driven 24" below grade a minimum of 72" apart in the form of an equilateral triangle, bonded together with No. 4/0 conductors. Install rods a minimum of 36" clear of foundation walls to effect the building ground. If the resistance to ground exceeds 25 ohms, additional rods shall be driven and bonded together until a reading of 25 ohms or less to ground is obtained. After completion of the grounding system, measure the system ground resistance with a "Megger Earth Tester". Submit directly to the Architect two (2) copies of each test report certified by the testing technician and the Owner's representative.
   2. Extend from the electrodes to the main service disconnect with a No. 4/0 copper insulated ground conductor in a 1" conduit and connect to the neutral bar, housing and frame.
   3. Provide a No. 4/0 copper insulated conductor across the water meter with the conductor attached with clamps to the water line on each side of the meter.
   4. Provide a No. 4/0 copper insulated ground conductor in a 1" conduit from cold water entrance pipe ahead of first valve to the main service disconnect and connect to the neutral bar, housing and frame.
   5. Where nonmetallic insulating couplings or dielectric flanges are used in metallic water piping systems, provide a No. 4/0 copper, insulated ground conductor across the couplings with the conductor attached with clamps to the water line on each side of the coupling.

6. All ground connections in the building system ground shall be done with Cadwell.
7. All ground clamps shall be equipped with compression type cable lugs independent of the compression device clamping the pipe or rod.
8. All steel conduit entering the main service disconnect shall have threaded conduit insulated grounding bushings. All bushings shall be bonded together and bonded to the main grounding bus with a No. 4 bare conductor.

B. Provide an insulated green bonding jumper from the grounding lug of all receptacles to a Steel City "GEE" clip or a sheet metal screw in the outlet box. The ground wire installed behind the device mounting screws will not be acceptable.

C. Provide 1 #6-3/4" conduit from the system ground to the telephone company main distribution frame or service cabinet and to each telephone backboard.

D. Provide a # 4/0 ground riser for the telecommunications service. The #4/0 ground riser shall extend from the MDF room up through the IDF room on each floor. A 20” x 4” copper ground bar shall be provided in each room for connections. The riser connections to the ground bar in each room shall be CADweld connecitons.

3.10 TELEPHONE CONDUIT SYSTEM

A. Telephone service shall include wood backboards and equipment cabinets with service entrance conduit as shown.

B. Telephone service entrance cable, all branch cabling and telephone instruments shall be provided by the telephone equipment vendor.

C. Provide an outlet and conduit system for the telephones as shown and leave the same in readiness for wiring by others. Provide pull line in all telephone conduit. Terminate all conduit at a uniform height with smooth insulated bushings at the telephone wood backboards.

D. Telephone wall outlets shall be pressed steel sectional switch boxes, wall mounted at the locations indicated. Coverplate shall have a bushed hole.

E. Telephone floor outlets shall be floor boxes as specified at the locations indicated.

3.11 CONNECTION TO EQUIPMENT

A. Equipment furnished by the Owner or under other Sections, such as mechanical equipment, elevators, escalators, signs, kitchen equipment, etc., will be installed by others. Provide electrical service and make the electrical circuit connection to this equipment.

B. Provide PVC insulated flexible cord sets for all cord and plug connected building appliances and equipment. Cords shall be sized in accordance with electrical circuits indicated. Multiple conductor cords shall be "SO" cable with PVC jacket and green insulated ground conductor.

3.12 CORING, CUTTING AND PATCHING

A. Set sleeves for conduit accurately before the concrete floors are poured, or set boxes on

the forms so as to leave openings in the floors in which the required sleeves can be subsequently located. Fill in the voids around the sleeves with concrete.

B. Should the performance of this preliminary work be neglected and should cutting be required in order to install conduit, then the expense of the cutting and restoring of surfaces to their original conditions shall be accomplished without incurring additions to the Contract.

3.13 EQUIPMENT ANCHORING

A. All items of electrical equipment, such as switchboards, motor control centers, transformers, standby generator, etc., shall be securely anchored to the building structure. The anchoring shall be accomplished by utilizing a minimum size of 3/8" steel anchor bolts in the structure and to the item of equipment. A minimum of two (2) anchor bolts shall be provided on each side of each item of equipment with the following exceptions:

Exception No. 1: If the equipment manufacturer includes more than two (2) anchor holes per side in the base or base frame of the equipment item, then there shall be one anchor for each anchor hole.

Exception No. 2: If the equipment manufacturer recommends a particular quantity greater than two (2) per side, then that quantity of anchors shall be provided.

END OF SECTION 261000

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SECTION 262000

SERVICE AND DISTRIBUTION

PART 1 - GENERAL

1.1 DESCRIPTION

A. All work specified in this Section shall comply with the provisions of Section 260100.

B. Provide a complete electrical distribution system. The system shall include the service entrance, main switchboards, feeders, transformers, distribution panels, panelboards, busway, remote control switches, contactors, etc., to provide a complete system.

C. All distribution switchgear (branch circuit panelboards, switchboards, distribution panelboards, transformers, busway, etc.) shall be the unit responsibility of one manufacturer. All component parts of the above listed items shall be of the same manufacturer except where a written request for deviation from this requirement has been approved prior to bid date.

D. Shop drawings for equipment specified in this Section shall show that all specified requirements have been incorporated.

E. All floor mounted distribution equipment shall be mounted on a 4" high concrete pad.

1.2 ELECTRICAL SERVICE

A. Make all arrangements with the power company and pay all charges made by the power company for permanent electric service. In the event that the power company's charges are not available at the time the project is bid, the bids shall be qualified to notify the Owner that such charges are not included.

B. The secondary service to the building shall be 277/480 volts, 3 phase, 4 wire, 60 Hertz AC. Provide all conduit and wire as specified from the secondary terminals of the transformer to the main switchboard.

1.3 METERING

A. Metering equipment will be by the power company. The power company will furnish the meter base for installation at a location as directed by the power company. The power company will provide meter, control wires to the meter, and the current transformers.

B. Provide the current transformers cabinet and a 1" conduit with fishwire to the meter base. Install all equipment as directed by the power company.

PART 2 - PRODUCTS

2.1 BRANCH CIRCUIT PANELBOARDS

A. Panelboards (panels) shall be general purpose enclosures and shall be surface or flush mounted as indicated. Panels shall be of the automatic circuit breaker type, factory assembled by the manufacturer of the circuit breakers. Panels shall be for the voltage

indicated with the quantity of poles and ampacity of circuit breakers shown.

B. Boxes and trim shall be made from code gauge steel. Boxes shall be sufficient size to provide a minimum gutter space of 4" on all sides. Boxes shall be minimum 20" width and 5 3/4" depth.

C. Hinged door covering all device handles shall be included in all panel trim. Doors shall have flush-type cylinder lock and catch, except that doors over 48" in height shall have auxiliary fasteners at top and bottom of door in addition to flush-type cylinder lock and catch. Door hinges shall be concealed. All locks shall be keyed alike. Directory frame and card having a transparent cover shall be furnished each panel door.

D. Trims for flush panels shall overlap the box by at least 3/4" all around. Surface trims shall have the same width and height as the box. Trims shall be mountable by a screwdriver without the need for special tools. After installation, trim mounting mechanism or hardware shall not be accessible when panel door is closed and locked.

E. All exterior and interior steel surfaces of the trim shall be cleaned and finished with gray paint over a rust-inhibiting phosphatized coating.

F. All interiors shall be completely factory assembled with protective devices, wire connectors, etc. All wire connectors, except screw terminals, shall be of the anti-turn solderless type and all shall be suitable for copper or aluminum wire.

G. Interiors shall be so designed that devices can be replaced without disturbing adjacent units and without removing the main bus connectors, and shall be so designed that devices may be changed without machining, drilling or tapping.

H. Bus bars for the mains shall be of copper sized in accordance with U.L. standards. Full size bars shall be included. Bus bar taps for panels with single pole branches shall be arranged for sequence phasing of the branch circuit devices.

I. Phase bussing shall be full height without reduction. Cross and center connectors shall be of the same material as the bus.

J. The neutral bus shall utilize setscrews to bond the neutral wire to the neutral bus through holes drilled in the neutral bar. A sheet copper neutral bus utilizing flathead screws to hold the neutral wires will not be acceptable.

K. Spaces for future devices shall be included as indicated and shall be bussed for the maximum rated device that can be fitted into them.

L. All circuit breakers shall be manually operated, thermal-magnetic, automatic, of the ampacity and poles as indicated. They shall be quick-make, quick-break, both on manual and automatic operation. Breakers shall be over-the-center toggle operating type, with the handle going to a position between ON and OFF to indicate automatic tripping. All multi-pole breakers shall have internal common trip. Breakers shall have a minimum of 10,000 RMS symmetrical amperes interrupting capacity unless designated otherwise. The breakers furnished shall be determined by the specifications and by the minimum U.L. labeled RMS symmetrical amperes interrupting capacity at circuit voltage. All circuit breakers shall be bolted on and rigidly braced.

M. Panels having sub-feed lugs for feeding through shall have 8" minimum extra gutter space at the lug end and on one side.

N. Each panel as a complete unit shall have a short-circuit current rating equal to or greater than the equipment rating indicated.

O. A listed surge protective device shall be installed in or on all emergency systems panelboards.

P. Panels shall be as manufactured by General Electric, Square D, Siemens, or Cutler-Hammer.

2.2 DISTRIBUTION PANELBOARDS

A. Distribution panelboards (panels) shall be of the circuit breaker type, factory assembled by the manufacturer of the circuit breakers, complete with front door cover. The main breaker and the branch circuit breakers shall be as indicated. The main bus shall be 98% conductivity silver plated copper, rated as and of capacity equal to or greater than the rating or setting of the over-current protective device next back in the line. Panel shall be suitable for the voltage and phase indicated. Provide 25% ground bus.

B. Panels shall be flush or surface mounted as indicated, with baked-on enamel trim, adjustable trim clamps and door with chromium plated combination cylinder lock and catch, all locks keyed alike. Provide a specified nameplate for each device and a blank (not engraved) nameplate for each spare breaker or space.

C. The neutral bus shall utilize setscrews to bond the neutral bus through holes drilled in the neutral bar. A sheet copper neutral bus utilizing flathead screws to hold the neutral wires will not be acceptable.

D. All circuit breakers shall be manually operated, thermal-magnetic, automatic, of the ampacity and poles as indicated. They shall be quick-make, quick-break both on manual and on automatic operation. Breakers shall be over-the-center toggle operating type, with the handle going to a position between "ON" and "OFF" to indicate automatic tripping. All multi-pole breakers shall have internal common trip.

E. The interrupting capacity of the breakers furnished shall be 10,000 RMS symmetrical unless indicated otherwise.

F. All main circuit breakers shall be molded case and vertically mounted. All vertically mounted molded case circuit breakers shall be mounted so that the handle is up for "ON" and down for "OFF", when viewed from the normal standing position. All vertically mounted molded case main circuit breakers shall be UL approved for feeding in the bottom and out the top.

G. All circuit breakers, including any connectors to the main bus, shall be bolted and rigidly braced.

H. Spaces for future installation of molded case circuit breakers are specifically by range of trip rather than a single trip size or frame size. The spaces so scheduled shall be complete with all bus and required bus connectors such that future breakers can be installed without adding or changing bus connectors on the main bus and without using a larger (frame size) or more expensive breaker than the trip size and interrupting capacity would require. If the

bus connectors furnished on the main bus will not cover the trip range specified, then duplicate sets of connectors shall be furnished on the main bus for each frame size required.

I. Distribution panels shall be as manufactured by General Electric, Siemens, Square D, or Cutler-Hammer.

2.3 TRANSFORMERS

A. Branch circuit and distribution transformers shall be the dry type and shall have the ratings indicated.

B. Single phase transformers shall be 480 volt primary and 120/208 volt secondary. Three phase transformers shall be 480 volt delta primary and 120/208 volt grounded type secondary. Transformers 25 KVA and larger shall have a minimum of 4 1/2% full capacity primary taps.

C. Transformers shall have a U.L. recognized 220 degree insulation system and shall be designed so that under full load, the average conductor temperature rise does not exceed 115 degree C. rise above a 40 degree C. ambient and the enclosure does not exceed a 50 degree C. rise at any point.

D. Transformer coils shall be of the continuous wound construction and shall be impregnated with non-hygroscopic, thermosetting varnish. All cores to be constructed of high grade, non-aging silicon steel with high magnetic permeability, and low hystersesis and eddy current losses. Magnetic flux densities shall be kept well below the saturation point. The core laminations shall be clamped together with structural steel angles. The completed core and coil shall then be bolted to the base of the enclosure but isolated therefrom by means of rubber, vibration-absorbing mounts. There shall be no metal-to-metal contact between the core and coil and the enclosure. On transformers 500 KVA and smaller, the vibration isolating system shall be designed to provide a permanent fastening of the core and coil to the enclosure. Sound isolating systems requiring the complete removal of all fastening devices will not be acceptable. Sound levels shall be guaranteed by the manufacturer not to exceed the following: 25 to 50 KVA - 45 DB; 51 to 150 KVA - 50 DB; 151 to 300 KVA - 55 DB; 301 to 500 KVA - 60 DB.

E. Transformers 24 KVA and larger shall be in a heavy gauge, sheet steel, ventilated enclosure. The ventilating openings shall be designed to prevent accidental access to live parts in accordance with UL, NEMA, and National Electrical Code standard for ventilated enclosures. Transformers 25 KVA through 112.5 KVA shall be designed so that they can be either floor or wall mounted. Above 112.5 KVA, they shall be floor-mounted design. The entire transformer enclosure shall be degreased, cleaned, phosphatized, primed and finished with a gray, baked enamel.

F. Transformers that are of the floor-mounted type shall be mounted on Korfund Vibration Eliminators of the pad type.

G. Transformers shall be DOE 2016 compliant.

H. Transformers shall be as manufactured by General Electric, Siemens , Square D, or Cutler-Hammer.

2.4 MAIN SWITCHBOARD

A. General

1. Provide where indicated, a front and rear accessible dead front type, completely metal enclosed, self-supporting structure independent of wall supports. It shall consist of the required number of vertical sections bolted together to form one rigid switchboard approximately 90" high incorporating switching and protective devices of the number, ratings and type noted herein or shown with necessary interconnections, instrumentation and control wiring. The sides, top and rear shall be covered with removable screw-on plates. Front plates shall be sectionalized and removable. All covers shall be secured by self-tapping screws. Ventilation openings shall be provided where required. The switchboard shall be vermin proof.
2. All sections of the switchboard shall be 20 inches deep except service sections containing large ampacity main circuit breaker or pressure contact type main fusable switch which may be deeper. All section of the switchboard shall align so that the back of the complete structure may be placed flush against a wall. Construction shall allow maintenance of incoming line terminations, main device connections and all main bus bolted connections to be performed with front and rear access.
3. The feeder or branch devices shall be removable from the front and shall be panel mounted with the necessary device line and load connections front accessible.
4. All exterior and interior steel surfaces of the switchboard shall be cleaned and finished with gray hard dried enamel over a rust-inhibiting phosphatized coating.
5. Small wiring, necessary fuse blocks and terminal blocks within the switchboard shall be furnished when required. All groups of control wires leaving the switchboard shall be provided with terminal blocks with numbering strips.

B. Bussing

1. The bus shall be tin plated aluminum or silver plated copper adequately braced and supported to withstand mechanical forces exerted during short circuit conditions. The main horizontal bus bars shall be mounted on glass polyester insulators with all three phases arranged in the same vertical plane. The main bus shall be braced for short circuits up to the RMS ampere value as shown.
2. A ground bus shall be provided firmly secured to each vertical structure and shall extend the entire length of the switchboard. A ground lug shall be furnished attached to the ground bus in an accessible location.
3. Provide a removable link (solid bar) in the neutral bus where the main disconnect device is provided.
4. Provide a bonding strap from the neutral bus to the switchboard frame. The bonding strap shall be located on the line side of the removable neutral link.

C. Circuit Breakers

1. Electrical circuits shall be protected by molded case circuit breakers. Each pole shall provide inverse time delay and instantaneous circuit protection.
2. Circuit breakers shall be operated by a toggle type handle and shall have a quick-make, quick-break overcenter switching mechanism that is mechanically trip free from the handle so that the contacts cannot be held closed against short circuits and abnormal circuits. Tripping due to overload or short circuit shall be indicated by the handle automatically assuming a position midway between ON and OFF positions.
3. Breakers must be completely enclosed in a molded case. Non-interchangeable trip breakers shall have the trip unit sealed to prevent tampering. Ampere ratings shall

be clearly visible. Contacts shall be of the non-welding silver alloy. Arc extinction must be accomplished by means of arc chutes.

4. All circuit breakers with frame sized 600 amps and larger shall have solid state trip units that are insensitive to changes in ambient temperature and a push-to-trip button to mechanically check the trip mechanism or for the use under emergency trip conditions. Interchangeable rating plugs shall establish the continuous current rating of each breaker. An interlock in the rating plug shall trip the breaker if an attempt is made to remove the plug with the breaker in the ON position. With the plug removed, it shall not be possible to close the breaker.
5. The solid state trip breakers shall provide long delay and magnetic tripping similar to thermal magnetic breakers. In addition, the magnetic trip shall include a short time delay permitting coordination and selective tripping with downstream devices. It shall be possible to check the breaker electrically and mechanically while in service without dismantling equipment and with minimum down time.
6. Where the highest continuous current trip setting for which the actual overcurrent device installed in a circuit breaker is rated, or can be adjusted, is 1200 amps or higher, documentation shall be available to those authorized to design, install, operate or inspect the installation as to the location of the circuit breakers for the purposes of arc energy reduction. One of following methods to reduce clearing time shall be provided:
   a. Zone-selective interlocking
   b. Differential relaying
   c. Energy-reducing maintenance switching with local status indicator
   d. Energy-reducing active arc flash mitigation system
   d. An approved equivalent means

D. Ground Fault Protection
1. An adjustable ground fault protection system shall be provided as an integral part of the main circuit breaker or main fused switch, designated feeder breakers and fused switches.
2. The ground fault protection system shall consist of a current sensor enclosing all phase and neutral conductors of the circuits to be monitored, appropriate relaying equipment to provide the desired ground current sensitivity and time-current response characteristics, and equipped to function in conjunction with the other elements of the system.
3. The current sensor shall be of sufficient size to encircle the phase and neutral conductors of the circuit to be monitored. Current sensor output shall be coordinated with the required input to the delay. The current sensor shall have a ground fault current pick-up range of 200 to 1200 amperes. A test winding shall be included to simulate the flow of ground fault current through the sensor to test the operation of the ground fault protection system. The frame of the current sensor shall be constructed so that one leg can be opened to allow removal or installation around cable without disturbing that cable.
4. The ground fault relay shall be solid state construction, except that a coil operated output relay may be provided to control 120 volt power to operate a fusible bolted pressure contact switch. The relay shall have an adjustable current sensitivity for ground fault pick-up currents from 200 amperes to 1200 amperes.
5. Provide a monitor panel on the switchboard, including a push-to-test button for the test circuit and a red ground fault indicator light to indicate the circuit interrupter has opened due to a ground fault condition. The unit shall operate on a 120 volt AC source.

6. Provide a pulsating audible horn that is activated when a ground fault condition occurs. Horn shall stop when ground fault protection system is reset. Horn shall operate during testing of ground fault protection system.

E. Short Circuit Current Rating
1. The switchboard as a complete unit shall be given a single short circuit current by the manufacturer of the rating as shown. Such a rating shall be established by actual test in accordance with U.L. specifications.

F. Provide internal digital meter in the switchboard to display a minimum of the following measured values: Real time readings, energy readings, demand readings and harmonics. Provide with Ethernet connection, Square D PM870 or equal.

G. Main switchboards shall be as manufactured by General Electric, Siemens, Square D, or Cutler-Hammer.

2.5 BUSWAY

A. Provide aluminum, totally enclosed, non-ventilated plug-in or feeder busway as shown, three-phase, of the ratings scheduled or shown. When a neutral bus is specified, the neutral shall be full size unless designated otherwise. Busway shall be of the low impedance type. The busway shop drawings shall show in detail the design of the totally enclosed busway including in detail, the design of the joint connection. Perforated ventilating housings will not be acceptable.

B. When a ground bus is specified, it shall be sized in accordance with the 2005 National Electrical Code based on the overcurrent protective device.

C. The aluminum bus bars shall be tin plated over their entire surface. All bolted connections shall be equipped with Belleville type spring washers. The temperature rise at full rated amperage at any point in the duct shall not exceed 55 degrees C. above ambient temperature.

D. Access shall be required to only one side of the busway for tightening joint bolts. It shall be possible to remove any one length without disturbing the two lengths to which it connects. On feeder busway, tap-offs shall be made with sections specifically designed for that purpose. In these cases, plug-in busway sections shall not be used.

E. The ampere ratings, approximate footage, fittings, etc., are shown. Final field measurements shall be made prior to release of the busway for fabrication. The responsibility for routing the duct as shown shall be included in this Section.

F. The busway shall be securely supported at intervals not exceeding 10'-0". The busway shall be complete with all elbows connectors, expansion joints, floor and wall flanges and offsets shown or required to meet job conditions. Wall flanges shall be provided at each wall and floor flanges at each floor where busway passes through. The openings between the flanges and the floor or wall should be caulked with suitable insulation material. Expansion joints shall be provided at building expansion joints, at least one in each horizontal run of 100'-0" and a maximum of 150'-0" apart throughout the busway length.

G. The busway shall be Underwriter's Laboratories approved for mounting in any position with derating. The short circuit stress bracing shall be 100,000 amperes RMS symmetrical.

H. Busway shall be of the same manufacturer as the main switchboard where connected to switchboard. Busway not connected to switchboard shall be General Electric, Siemens, Square D, or Cutler-Hammer.

2.6 SINGLE PHASE PROTECTION

A. Provide Taylor Electronics Model #PND-3, 6, 9, 12 ADJ-REM LED's, or equal, single phase relay behind hinged panel in switchboard. Provide green and amber LED's on a plug in cable for mounting on face of switchboard. Provide snap on lenses and labels identifying the green LED as "SYSTEM NORMAL" and the amber LED as "SINGLE PHASE CONDITION".

B. Provide shunt trip coils on all main devices, operated by the phase failure relay.

C. Provide capacitive trip unit to guarantee relay and shunt trip operation during a single phase occurrence.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide a typewritten directory under plastic for all panelboards with spares marked in pencil.

B. Provide all necessary hardware to level and secure the switchgear as required by the manufacturer's instructions. Make all electrical connections for supply and load circuits and leave in operating condition.

C. Clean enclosure of all switchgear of all foreign matter, including dust.

D. Remove all rust marks and repaint to leave switchgear in new condition.

3.2 STUDIES

A. As a requirement for the project documents to be delivered by the contractor, provide a complete short circuit and selective coordination study from the service entrance to all end devices. The study shall be provided by the switchgear manufacturer or their vendor and shall utilize time current curves that are developed by the gear manufacturer selected for use in the building. The study shall be made available for review by the engineer and local code enforcement authorities no later than at the times they deem necessary for certificates of occupancy to be issued. Obtain critical dates from the inspections department of the local code enforcement department during the inspection process to determine when presentation of the selective coordination study to the inspections department is necessary for timely issuance of the certificate of occupancy.

B. The selective coordination study shall be broken into parts where the systems described in NEC Articles 700.27, 701.18, 708.54 and 620.22 are isolated in the report to simplify the review of those isolated systems.

C. As a minimum requirement for the details that are necessary in the selective coordination study, refer to the requirements for selective coordination in the 2008 NEC Articles 700.27, 701.18, 708.54 and 620.62.

D. The minimum NEC requirement for the selective coordination study is applicable to the systems described in NEC Articles 700.27, 701.18, 708.54, 620.62, and as indirectly referenced for essential electrical systems in Article 517. The minimum project requirement described in A. above shall not be scaled back to the minimum NEC code requirement unless agreed to by all parties associated with the construction of the project including, but not limited to, the owner, architect, engineer, developer, etc.

END OF SECTION 262000

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SECTION 263000

LIGHTING

PART 1 - GENERAL

1.1 DESCRIPTION

A. All work in this Section shall comply with the provisions of Section 260100.

B. Provide all lighting fixtures and lamps as specified herein and as shown.

C. All lamps shall be operating at the time of the final inspection and for a period of six (6) months after the final acceptance of the project by the Owner.

D. Confirm exact locations of all lighting fixtures by coordination with the Architects Reflected Ceiling Plans and mechanical equipment above or on the ceiling.

E. Confirm all ceiling types before ordering lighting fixtures.

F. Each lighting fixture shall have been tested and certified for proper operation by the fixture manufacturer for the type mounting and ceiling on/in, which it is installed.

PART 2 - PRODUCTS

2.1 LIGHTING FIXTURES

A. Each lighting fixture shall be as specified in the Lighting Fixture Schedule corresponding with its fixture type indication (letter).

B. Most lighting outlets are lettered or groups of outlets are indicated by a letter.

C. Each lighting fixture shall have a manufacturer's label affixed and shall comply with the requirements of all authorities having jurisdiction.

D. The lighting fixtures that are indicated by the letters shall be as indicated on the Lighting Fixture Schedule.

2.2 LAMPS

A. The type lamps shall be as specified for each lighting fixture in the lighting fixture schedule.

B. The lamp catalog number is the catalog number is generally for Sylvania Lighting and is given as a standard of the quality and performance required. Equal lamps by General Electric or Philips will be acceptable. When a lamp manufacturer's name is used along with the catalog number in the lighting fixture schedule, it is considered unequaled by any other lamp and shall not be substituted for. The lamp performance with energy conserving ballasts furnished under this Section shall be certified by a nationally recognized independent testing laboratory.

C. Fluorescent lamps shall be as specified in the Lighting Fixture Schedule.

D. Incandescent lamps shall be as specified in Lighting Fixture Schedule.

E. All incandescent lamps, except quartz tubes, shall be rated for 130 volt operation.

F. High Intensity Discharge (HID) lamps shall be as specified in the Lighting Fixture Schedule.

2.3 BALLASTS (electronic)

A. Fluorescent ballast shall be electronic type manufactured by Motorola, Magnetek or Advance.

B. Ballast shall operate lamps at a frequency or 25 KHz or higher with less than 2% lamp flicker.

C. Ballast shall operate at an input voltage of 108 - 132 Vac (120V line) or 249 - 305 Vac (277V line) at an input frequency of 60 Hz. Light output shall remain constant for line voltage fluctuation of ± 5%.

D. Ballast shall comply with EMI and RFI limits set by the FCC (CFR 47 part 18) for non-residential applications and not interfere with normal electrical equipment.

E. Ballast shall withstand transients as specified by ANSI C.62.41 for location category A3 in the normal mode and location category A1 in the common mode.

F. Ballast shall meet applicable ANSI standards.

G. Ballast shall have a minimum power factor of .99.

H. Ballast shall not be potted or weigh more than 1.3 pounds.

I. Ballast shall have less than 10% Total Harmonic Distortion.

J. Ballast shall have less than 6% Third Harmonic Distortion.

K. Ballast height shall be less than or equal to 1.5 inches.

L. Ballast shall have a poke-in wiretrap connector.

M. Ballast shall meet sound rating "A".

N. Ballast must be Underwriters Laboratories (UL) listed Class P, Type 1 Outdoor.

O. Ballast shall provide normal rated lamp life as stated by lamp manufacturers.

P. Rapid start ballast are series wired and shall maintain full cathode heat during operation.

Q. Rapid start ballast shall have less than a 1.5 Lamp Current Crest Factor (LCCF) and instant start ballasts have less than a 1.7 LCCF.

R. Instant start ballast shall have parallel lamp operation.

S. Ballast factor standard is .875±0.025 on all normal light output products.

T. Ballasts for "PL" fluorescent lamps shall be coordinated with lamps and 2-pin or 4-pin configuration ballasts shall be provided to match lamps. Manufacturer for "PL" fluorescent fixtures shall be Advance, Roberson, Lightolier or Lutron.

U. Ballasts for High Intensity Discharge (HID) lamps shall be Constant Wattage Autotransformer (CWA) type or equal type with minimum power factor of .9.

2.4 DIFFUSERS

A. Unless specified otherwise, all prismatic diffusers for fluorescent lighting fixtures shall be prismatic acrylic KSH K12 with a thickness of 0.125", measured from the back side to the peak of the prism.

B. All wraparound lenses shall be virgin acrylic, one-piece and injection molded.

2.5 LIGHT FIXTURE TRIM

A. Each recessed lighting fixture shall have a trim to match the type of ceiling (plaster, exposed grid, concealed spline, exposed panel, etc.) in which it is being installed, regardless of catalog number given. Coordinate with the Architect's reflected ceiling plan to provide the right trim for the type of ceiling the fixture is to be installed in.

B. Each lighting fixture recessed in a plastered ceiling of any type shall have a plaster frame.

2.6 LIGHTING CONTROL

A. Provide a Lutron XPS, main lug only control panel on floor indicated on riser diagram.

2.7 RECESSED INCANDESCENT FIXTURES

A. All recessed incandescent fixtures shall comply with Article 410-65, C of the N.E.C.

PART 3 - EXECUTION

3.1 SUPPORT OF LIGHTING FIXTURES

A. All lighting shall be supported from the building structure. The fixtures shall be supported in a manner that will insure the fixture weight being equally distributed from each support and the fixture remaining in a level position.

B. Fluorescent fixtures installed recessed in a suspended ceiling system shall be supported from the building structure with two (2) 12 gauge wires on diagonal corners of the fixture. In addition, the fixture shall be clipped to members of the ceiling suspension system.

C. Fluorescent fixtures installed in or on any ceiling other than a suspended ceiling system specifically mentioned above shall be supported with concealed steel rods. Rods shall be 1/4" diameter minimum and shall be located where recommended by the fixture

manufacturer. Provide a minimum of two (2) supports for each 4' or 8' fixture chassis. Supports shall be maximum of 48" centers. For incandescent fixtures, steel hanging wire may be used by attaching the wire to the fixture mounting frame.

D. Pendant mounted incandescent fixtures shall be stem supported by a fixture stud mounted in the outlet box. Suspended fluorescent fixtures shall have mounting stems located as per the manufacturer's recommendations, but in no case shall have less than two (2) stems per chassis.

3.2 AIMING OF ADJUSTABLE LIGHT FIXTURES

A. All fixtures with lamp position, tilt, shutters, rotation, or other types of adjustments during the final inspection. Fixtures serving areas where day lighting is predominant will be adjusted after sunset.

3.3 LIGHTING FIXTURES IN MILLWORK

A. Special attention shall be given to lighting fixtures indicated to be mounted within, under, on or otherwise incorporated into millwork or cabinetry.

B. Refer to the Architectural drawings and details for specific dimensions. This coordination shall occur prior to ordering fixtures to assure fixtures will fit the space limitations of the millwork.

C. This requirement is intended to preclude incurring additions to the Contract due to fixtures being too small or too large for the space.

END OF SECTION 263000

SECTION 265101

ARCHITECTURAL LIGHTING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY:

A. Work Included:
1. Provide and install fixtures as shown on the Drawings and schedules complete with all specified lamps, completely wired, controlled and securely attached to supports.
2. Provide all materials, accessories and any other equipment necessary for the complete and proper installation of all lighting fixtures specified herein.
3. Fixture Types: Type of fixture shall be as indicated on the Drawings and as specified below in the Fixture Type Schedule.
4. Lamping: Lamping for each type of fixture shall be as indicated on the Drawings and as specified below in the Fixture Type Schedule.
5. Coordination: Coordinate installation, connection, and securing of all lighting fixtures with adjacent construction and with all other applicable trades to provide a total system that is complete and finished in appearance.
6. Completeness: The specifications and Drawings pertaining to this scope of work, are intended to convey the salient features, function and character of the fixtures only, and do not undertake to illustrate or set forth every item or detail necessary for the complete installation of the work.
7. Minor Details: Minor details, not usually indicated on the Drawings nor specified, but that are necessary for the proper execution, completion and installation of the fixtures, shall be included, as if they were herein specified or indicated on the Drawings.
8. Omissions and Clarifications: Where any fixture type or lamping designated has been omitted or cannot be determined by the Subcontractor, request a clarification from the Architect and provide the fixture type as directed. Where an inconsistency in the specifications and/or the Drawings is determined by the Subcontractor, request a clarification from the Architect and provide as directed. There will be no increase in cost permitted to correct any inconsistency within the documents so long as the overall intent of the work scope is not changed.
9. Owner Furnished Contractor Installed Items (O.F.C.I.I.): Fixtures specifically designated as O.F.C.I.I. in the specifications, or on the Drawings, shall be provided by the Owner to the Subcontractor, and installed by the Subcontractor, to the same level of completeness and coordination as afforded all other fixtures in this specification.

B. Bid Instructions:
1. Provide itemized per unit cost distributor net pricing for all fixture types.

1.3 SUBMITTALS:

A. Refer to Section 01 33 00, Submittal Procedures.

B. Shop Drawings: Where indicated for specific fixture types below, submit full-size shop drawings cross-referenced to contract documents, indicating name of project, fixture type, construction of fixture, dimensions, material thicknesses, finishes, joints, lamping, anchorages, and relationship to adjacent materials and complete details and/or data of fixtures, including Manufacturer's

name, catalog number for lampholders, transformers, ballasts, metal gauges, independent test reports, photometric data, type of wiring, color and texture of finishes.

1. No variation from the general arrangement and details indicated on the contract document Drawings shall be made on the shop Drawings unless required to suit the actual conditions on the project, and then only with the written acceptance of the Architect. All variations must be clearly indicated as such on the shop Drawings submitted for approval.
2. Submit Shop Drawings for all low voltage transformer and power supply locations. Power supply locations shall be indicated via sketch format by the Subcontractor.
3. Submit full Shop Drawings and full scale samples for all custom fixtures.
4. Submit full Shop Drawings for all remote ballast locations.
5. Submit full Shop Drawings for all Cold Cathode fixture layouts.

C. Samples: Where indicated for specific fixture types in the Fixture Type Schedule, a sample will be required for the purpose of ascertaining its performance, quality of parts and details, maintenance features, method of installation and safety features. Samples must be wired for simple plug-in operation for evaluation purposes. Samples to be shipped prepaid by the Subcontractor to the Design-Builder, or as otherwise advised. No payment shall be required for samples, and will be submitted at no additional cost to the Owner. Samples submitted for evaluation purposes will not be returned unless a prepaid shipping number is provided by the Subcontractor, nor are they to be included in the quantities listed for the project.

1. For each sample fixture submitted, submit photometric data from an independent testing laboratory, of the submitted sample.
2. All sample fixtures must be tested and labeled by Underwriters' Laboratories Inc, and bear such label affixed to each fixture in such a position as to conceal it from normal view.
3. Fixture samples and photometric data shall be submitted for final review within thirty (30) days after receipt of reviewed shop Drawings. If after a period of thirty (30) days from submittal of sample, the fixture cannot be made acceptable, then a fixture, (shop drawing and sample), by one of the additional Manufacturers specified, shall be submitted for review at no extra cost to the Owner.
4. Construction time permitting, and then only with the written acceptance of the Architect, sample fixtures may be submitted for review of workmanship and material finishes only, prior to the submittal of the complete working sample. The approval of a sample for workmanship and material finishes, does not negate the requirement for submission of the complete working sample including photometric data and UL label.

D. Product Data:

1. Cut Sheets: For all fixture types where Shop Drawings are not specifically indicated for submission, submit standard Drawings, or cut sheets, including product data and photometric data.
2. Lamping: For all fixture types submit cut sheets for lamping including: Manufacturer, Manufacturer's catalog number; and quantity of lamps per fixture.

E. Mock-ups: If required by article, Mock-ups, make submittals required for mock-up construction and obtain necessary approvals prior to commencement of mock-up construction. Submit Mock-up Shop Drawings of each mock-up, showing: materials, dimensions, details, hardware, fixture, lamping, and proposed mock-up location.

1. When Required: Where indicated below, and/or as indicated on the Drawings, provide a mock-up as specifically indicated herein. Where practical, with prior approval of the Architect, mock-ups may be constructed on site, and when approved be incorporated into the project. Mock-ups to be constructed within 90 days of Notice to Proceed.
    a. S201 – vertical LED strip at Hotel Facade
    b. S203A & S203B – LED strip to accent top of smaller buildings and Hotel
    c. S307 – meeting room coves, exhibit corridor
    d. S308A & S308B – hotel lobby and guest corridor coves, guest room closet light

e. S310 – bookshelf lighting

2. Performance Requirements: Mock-ups shall be constructed for Architect's review for compliance with the Contract Documents; approval of color, texture, finishes quality, detail and illumination; and shall be used as a standard for the final installation.
3. Review and Approval: Upon completion of mock-up construction, notify the Architect and make arrangements for review. Modify the mock-up or construct new components if requested by the Architect, until final approval is obtained.

F. Certifications: With all submittals, provide a statement declaring that all lighting fixtures and fixture Drawings have been coordinated with the Drawings and details of the Architectural, Structural, Electrical, Mechanical, and other related trades to assure an accurate and efficient installation.

G. Closeout Submittal:
1. Maintenance Manual: Prior to the completion of the project submit, for incorporation into the overall project maintenance manual, recommended maintenance requirements from the Manufacturers of each fixture type, including:
   a. A quantity of two (2) of any special tools required.
   b. Types of cleaners to be used.
   c. Replacement parts identification lists and contacts for all fixtures, including all lamping.
   d. Recommended maintenance schedule and procedures.
   e. Final as-built shop Drawings for all fixtures that required shop drawing.

1.4 QUALITY ASSURANCE:

A. Subcontractor's Quality Assurance Responsibilities: Subcontractor is solely responsible for quality control of the Work. Comply with the requirements specified in Section 01 40 00, Quality Requirements.

B. Quality: All fixtures, lamping, accessories, and materials, shall be new, of good quality, and free from defects which in any manner may impair their character, appearance, strength, durability and function.

C. Replacement of Damaged Fixtures: All blemished, damaged, or unsatisfactory fixtures shall not be installed. All blemished, damaged, or unsatisfactory fixtures shall be replaced in a satisfactory manner as directed by the Architect.

D. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and Municipal authorities having jurisdiction. Obtain necessary approvals from all such authorities.

E. Listing: All fixtures shall be manufactured in strict accordance with the appropriate and current requirements of the National Electrical Code as verified by Underwriters' Laboratories Inc., or other testing agency as acceptable to local code authorities. Such a listing shall be provided for each fixture type, and the appropriate applicable regulatory agency label or labels shall be affixed to each fixture in such a position as to conceal it from normal view. Listing and labels shall be provided for wet locations as required, and as specified herein.

F. Substitutions: The lighting designated for this project is based on fixture types and lamping as specified. Identification of specified fixtures and lamping by means of Manufacturers' names and catalog numbers is to establish basic features, aesthetics and performance standards. Any substitutions must meet or exceed these standards. If substitution of fixtures, and/or lamping,

other than those specified is desired, provide the following information noted below, for both the specified fixture and lamping, and the proposed equal substitute fixture and lamping, for evaluation by the Architect. All substitution requests must be submitted in accordance with Section 01 25 00, Substitution Procedures.

1. Fixtures submitted for substitution are required to have been in commercial use for at least one (1) year unless otherwise noted.
2. Submit all performance data noted below in paragraph, Equality.
3. At the discretion and request of the Architect, and at no additional cost to the Owner, provide lamped, working samples of both the specified fixture and the proposed substitute fixture for evaluation by the architect. Samples must be wired for simple plug-in operation for evaluation purposes. Samples to be shipped prepaid by the Subcontractor to the Architect, or as otherwise advised. Samples submitted for evaluation purposes will not be returned, nor are they to be included in the quantities listed for the project.

G. Approved Additional Manufacturers: The lighting designated for this project is based on fixture types, and lamping, as specified. Identification of specified fixtures by means of Manufacturers' names and catalog numbers is to establish basic features, aesthetics and performance standards.

1. Where Approved Additional Manufacturers are listed for a particular fixture type, a substitute fixture from that Manufacturer may be submitted to the one specified. The fixture must still meet all of the performance requirements noted below in paragraph, Equality, and must be submitted for evaluation by the Architect in accordance with Section 01 25 00, Substitution Procedures.
2. Where an Approved Additional Manufacturer and specific fixture catalog numbers are listed for a particular fixture type, the specified fixture from that Manufacturer may be submitted as an equal fixture to the one specified. The fixture must still be submitted for review by the Architect in accordance with article, Submittals.

H. Qualifications: Within thirty (30) days of award of bid, Subcontractor must furnish all required data and samples, noted in paragraph, Substitutions, for all substituted fixtures, and/or lamping, including substitution requests and associated Manufacturers. If fixture fails to comply with the specification requirements at that time, Subcontractor will furnish specified fixture at no additional cost to the Owner, and with no delay to the project.

I. Equality: Equality shall be determined by comparisons of actual fixtures, and lamping, and of the following fixture and lamping characteristics. The Architect shall be the final authority with respect to equality.

1. Performance:
   a. Photometric data.
   b. Distribution.
   c. Utilization.
   d. Efficacy.
   e. Efficiency.
   f. Average brightness/maximum brightness.
   g. Spacing to mounting height ratio.
   h. Visual comfort probability.
   i. Ballasts.
   j. Transformers.
   k. Heat dissipation.
2. Construction:
   a. Engineering.
   b. Workmanship.
   c. Rigidity.
   d. Types of materials.
   e. Thicknesses and gages of fixture materials.

f. Light tightness, no light leaks will be accepted.
g. Permanence and quality of materials and finishes.
h. Physical Dimensions, both visible, and hidden from normal viewing.
i. Required clearance dimensions.

3. Installation Ease:
   a. Captive parts and captive hardware.
   b. Provisions for leveling.
   c. Through-wiring ease.
   d. Securing and attachment to adjacent construction.
4. Maintenance:
   a. Re-lamping ease.
   b. Replacement of transformers, ballasts, lamp sockets, and other components or accessories.
5. Appearance:
   a. Light Tightness.
   b. Aesthetic appearance.
6. Lamping:
   a. Center Beam Candle Power (CBCP).
   b. Color Rendering Index (CRI).
   c. Color Temperature (°K).
   d. Light Output, Mean and Initial Lumens.
   e. Lamp Life, Rated Average Life (Hours).
   f. Lamp Optics.
   g. Physical Dimensions.
   h. Physical Materials, including coatings and internal gas composition.
   i. Type of Base.
   j. Filament Design.
   k. Voltage.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Deliver lighting fixtures and lamping, individually wrapped in factory-fabricated containers unless otherwise noted.

B. Handle lighting fixtures and lamping, carefully to prevent breakage, denting and scoring the fixture finish. Do not install damaged lighting fixtures; replace and return damaged units to equipment Manufacturer.

C. Store lighting fixtures, and lamping, in clean, dry space. Store in original cartons and protect from dirt, physical damage, weather, and construction traffic.

D. All fixtures, lamping, accessories, and materials are to be effectively protected from damage or injury from the time of fabrication to the time of delivery and until final acceptance of the work.

1.6 WARRANTY:

A. Ballasts and transformers shall be warranted for a minimum of three years, or that period offered by the ballast Manufacturer, whichever is greater. Replacement of faulty materials, and the cost of labor required to make the replacement shall be the responsibility of the Subcontractor.

1.7 EXTRA MATERIALS:

A. Precise extra materials requirements shall be determined in discussion with Owner's facility management group. At this time, the Subcontractor shall assume a 2% attic stock for fixtures exceeding 50 in quantity, and 4% for fixtures less than 50 in quantity.

PART 2 - PRODUCTS

1.8 MANUFACTURERS:

A. The Manufacturer of each fixture type, and lamping, shall be as indicated on the Drawings and as specified below in article, Fixture Types. Refer to the requirements of paragraph, Approved Additional Manufacturers, for additional information.

1.9 MATERIALS AND FABRICATION:

A. Fixture fabrication and workmanship shall conform to the highest commercial standard as specified and indicated on the Drawings.

B. Dissimilar metals used in fabrication must be separated to prevent galvanic action.

C. Ferrous mounting hardware and accessories shall be finished using either a galvanic or phosphate primer backed paint process to prevent corrosion and discoloration of plaster surfaces.

D. Hardware: For steel and aluminum fixtures, all screws, bolts, nuts and other fastening and latching hardware shall be: stainless steel; cadmium; or equivalent. For stainless steel fixtures all hardware shall be stainless steel. For bronze fixtures, all hardware shall be stainless steel or bronze.

E. Light Leaks: Fixtures shall be free of light leaks. Light leaks between trims of recessed fixtures and the surfaces they are mounted upon shall not be acceptable.

F. Heat Dissipation: Fixtures shall be designed to provide sufficient heat dissipation and ventilation of lamps and ballasts including vent holes where required.

G. Lampholders (and Sockets): Lampholders shall hold lamps securely against normal vibrations and maintenance handling. All lampholders in lighting fixtures shall be suitable for the indicated lamps, and shall be set so that lamps are positioned in optically correct relation to all lighting fixture components. If adjustable socket positions are provided, socket should be preset in factory for lamp specified. If different socket positions are specified for the same fixture, sockets shall be preset for each type, and their cartons marked accordingly.

H. Wiring channels and lampholder mountings shall be rigid and accurately made.

I. Castings: For standard and custom fixtures made from castings, all castings shall be exact replicas of the approved casting patterns, and shall be free of sand pits, burrs, blemishes, scales and rust, and shall be smoothly finished. Tolerance shall be provided for any shrinkage of the metal castings, in order than the finished castings will accurately fit in their designated locations.

J. Reflector Cones:
1. Provide 45 degree lamp and lamp image cut-off unless otherwise specified.
2. Plastic materials shall not be used for reflector cones, aperture plates, or other exposed components of the reflector assembly.
3. Fixtures in which reflector cones are riveted or welded to housing or where removal of cone requires pressure to be applied to finished surface of reflector shall not be acceptable.
4. Cone Flange: Cone flange shall be formed as an integral part of the cone and shall have identical color and finish as the cone, except as shown. The major flange surface shall be perpendicular to the cone axis. The width of the flange shall adequately cover the

ceiling opening without light leaks. No fixture parts (housing, mounting frame, etc.) shall be visible between the ceiling surface and the edge of the cone flange.

5. Reflector cones shall be manufactured of uniform gauge, not less than 0.032" thick, high purity aluminum Alcoa 3002 alloy free of spin marks or other manufacturing defects.
6. The reflector inner surface finish shall be highly specular as produced under the Alzak process. The reflector inner surface shall be free of water spotting and shall maintain a reflectivity ratio of not less than 83% on clear specular finish.
7. Fixtures with Alzak reflector cones, unless otherwise specified, must be furnished by the same Manufacturer.

K. In adjustable fixtures, positive locking and aiming devices for both pan and tilt of lamp shall be provided.

L. Fixtures with an adjustable lamp and using a lamp with an asymmetrical light pattern shall have an aiming stop which can be permanently set so that the lamp shall remain correctly positioned after service or relamping.

M. Lamping: Lamping for each type of fixture shall be as indicated on the drawings and as specified below in article, Fixture Types.

1. Any and all lamps banned under the United States Energy Policy Act of 1992 (EPACT), shall not be permitted for use on this project.
2. Acceptable Manufacturers: Where no specific manufacturer is listed, acceptable manufacturers are as follows:
   a. General Electric
   b. Osram Sylvania
   c. Philips Lighting

N. Voltage: Voltages for each fixture type shall be as indicated on the electrical plans and schedules.

O. Plenums: Lighting fixtures recessed in a hung ceiling where the space above the hung ceiling is used as a plenum chamber for either supply or return air for the air conditioning system shall be designed, manufactured, and wired to conform with local code requirements.

P. Ballasts:

1. General
   a. All ballasts shall exceed ANSI C82.11 limits for Total Harmonic Distortion (THD). No ballast shall have a THD exceeding 10%.
   b. All ballasts shall meet FCC Part 18 (RFI & EMI) non-consumer standards for electrical equipment (Class A). Noisy or defective ballasts shall be replaced at no cost to the Owner.
   c. All ballasts shall meet or exceed ANSI/IEEE 62.41 Category A standards for Transient Voltage Protection. They shall also be thermally protected with overload and short circuit protection with a Class P rating.
   d. All ballast shall meet UL 935 standards and be UL Listed.
   e. No ballast shall contain Polychlorinated Byphenols (PCB's) in accordance with US law.
   f. Ballast shall meet all US state and federal efficacy laws.
   g. All ballasts shall carry a five year warranty from the date of Manufacturer.
   h. Wherever possible, electronic ballasts shall be used.
   i. Lamp crest factor shall not exceed 1.7 for any ballast.
   j. All ballasts shall contain an End-Of-Life (EOL) detection and shut down circuit in accordance with ANSI/IEC proposed standards.
   k. Ballasts shall be suitable to operate in:
   l. In non air-conditioned spaces: 10 to 65 degrees C. ambient.
   m. Outdoor applications: -18 to –29 degrees C ambient.

2. Fluorescent Ballasts:
   a. Ballasts shall be instant start or programmed rapid start ballasts, as specified in luminaire schedule, and from the same manufacturer for the entire project, unless otherwise specified. No preheat or trigger start ballasts shall be acceptable.
   b. Ballasts shall operate between 108-132V (120V) and 249-305V (277V), whichever is applicable according to the electrical power distribution Drawings.
   c. Ballast shall be able to withstand a voltage dip of up to 20% without affecting lamp output.
   d. No ballast shall have a ballast factor of less than .90, unless specified otherwise.
   e. All ballasts shall have a power factor greater than 90 percent (i.e. High Power Factor), and with maximum input watts not to exceed values indicated in project luminaire schedule.
3. Dimming Ballasts:
   a. For fixtures that require dimming ballasts, ballasts shall have a full continuous range of dimming from 100% to 1%.
   b. Ballasts must be able to start lamp at any level without having to start at the high level first.
   c. Ballast input wattage must be able to be reduced to less than 20% of nominal.
   d. Ballast must be controlled via a forward phase cut-signal on the powerline.
   e. All dimming ballasts shall be manufactured by the same company in order to assure consistent dimming across all lamp and fixture types.
   f. 90% of operating voltage shall be obtained in seven minutes.
   g. Ballast shall be able to withstand a voltage dip of up to 20% without affecting lamp output.
   h. Ballasts shall have a ballast factor of one.
   i. Ballast shall be rated for source and wattage intended lamp.
   j. Ballasts shall have an “F” UL 1029 Bench Top Rise Temperature Code.
   k. Ballasts shall operate between 108-132V (120V) and 249-305V (277V), whichever is applicable according to the electrical power distribution and Drawings.
4. Acceptable Ballast Manufacturers:
   a. Fluorescent Ballasts (Electronic):
      1) Lutron
      2) Osram
      3) Advance
   b. Fluorescent Dimming Ballasts (Electronic):
      1) Lutron
      2) Osram
   c. Fluorescent Dimming Ballasts (Digital):
      1) Lutron
      2) Osram
5. Remote Ballasts:
   a. Remote ballasts may not exceed distance recommended by the Manufacturer.
   b. Remote ballasts must be located in existing access panels as indicated on the Architectural Drawings.

Q. Transformers:
1. All transformers shall be electronic unless otherwise noted.
2. Acceptable Magnetic Transformer Manufacturers:
   a. Q-tran Inc.
   b. Semper Fi
3. Remote Transformers: All remote transformers shall be UL listed as a Low Voltage Lighting Power Supply Centers (PSC), and shall comply with N.E.C. Article 411. Where noted on the Drawings, specifications, or cut sheets, provide remote transformers as indicated herein.

4. For all remote transformers: Provide Q-Tran Inc. Series, QT or QX Model, Remote Transformers/Power Centers, as recommended by Q-Tran, based on load and voltage drop considerations, unless otherwise indicated on the Drawings.
5. All PSC shall have a minimum of 1-5 secondary circuit breakers ranging from 5A, 10A, 12.5A, 15A, 20A, to 25Amps.
6. All remote transformers shall be magnetic toroidal transformers. Toroidal transformers shall have a thermal auto-reset breaker wound into the toroidal transformer.
7. All remote transformers shall be Multi-Volt and have a minimum of 4 primary taps to provide either 12, 13, 14, 15V (or 24, 26, 28, 30V) at full load.
8. Efficiency: Shall be 95% efficient minimum.
9. Remote transformers shall have secondary circuit protection included into the Power Supply Center, maximum of 25Amps per N.E.C. article 411.
10. Remote transformers shall have primary circuit protection.
11. Remote transformers shall have Chokes.
12. Remote transformers shall have terminal blocks for both primary and secondary terminations.
13. Remote transformers shall have a separate wiring compartment from the transformer compartment.
14. Remote transformers shall be UL Listed: Inherently Protected type IC for recess mounted into a 2X4 Stud wall with a zero clearance rating to combustible materials.
15. Remote transformer enclosures shall be painted with white powder coat paint, unless noted otherwise.
16. Manufacturer shall provide Voltage drop calculator to determine distance and wire gauge from the transformer to the load.
17. Manufacturer shall offer remote transformer in 277V option (120V standard). Verify primary voltage with the Drawings.
18. Transformer voltages: Transformer voltages and wattages shall be determined by the Architect.
19. Transformer locations: Transformers must be located in existing access panels as shown on the Drawings.

R. LED Fixtures – White & Static Color
1. All LED fixtures specified on the manufacturer's fixture cut sheets are to establish minimum performance criteria for each fittings application.
2. All LED fixtures will comply with the requirements of the following standards:
   a. ANSI/NEMA/ANSLG C78.377-2008 – American National Standard for the Chromaticity of Solid State Lighting Products
   b. LM-79-08, IESNA Approved Method for the Electrical and Photometric Measurements of Solid-Sate Lighting Products
   c. LM-80-08, IESNA Approved Method for Measuring Lumen Maintenance of LED Light Sources
3. All LED fixtures on this project are subject to partial mock-ups as outlined in the architectural specifications.
4. All LED fixtures are subject to review by the Owner's Representative and written approval prior to installation.
5. Manufacturer of LED systems shall utilize an advanced production LED binning process to maintain color consistency. All LED individual fixture types must be shipped at the same time and stored on –site to ensure that products have been produced from the same bin. Tolerances greater the 200K will not be acceptable.
6. All white LED's shall be have a color temperature no higher than 3200K with a CRI no less than 80.
7. Efficacy of LED's should exceed 40 lumens per watt.
8. The LED fixtures shall be operated at constant and carefully regulated current levels. LEDs shall not be overdriven beyond their specified nominal voltage and current.
9. High power LED fixtures shall be thermally protected using one or more of the following thermal management techniques: metal core board, gap pad, heat sinks and/or internal

monitoring firmware. Junction temperature of LED shall not exceed LED chip manufacturer's recommendation.

10. LED fixture housings shall be designed to transfer heat from the LED board to the outside environment.
11. Where applicable, for wet location use, LED-based fixture itself shall be sealed, rated, and tested for appropriate environmental conditions, not accomplished by using an additional housing or enclosure.
12. All hardwired connections to LED fixtures shall be reverse polarity protected and provide high voltage protection in the event connections are reversed or shorted during the installation process.
13. Fixtures used on the exterior building facades shall have a minimum IP56 rating. All LED fixtures and power/data supplies shall be provided by a single manufacturer to ensure compatibility.
14. All products associated with installation and control of the LED system, including peripheral devices and software are to be provided by a single manufacturer.
15. Power/data supply shall provide miswiring protection.
16. Power/data supply shall provide connections that are conduit-ready or clamp-style connections for the low-voltage wiring.
17. Power/data supply shall come with a housing that meets a minimum IP20 rating for dry location installation.
18. All LED fixtures (100% of each lot) shall undergo a minimum eight-hour burn-in test during manufacturing.
19. All LEDs used in the LED fixture shall be high brightness and proven quality from established and reputable LED manufacturers in business for greater than 5 years.
20. All power/data supplies shall be located on the interior of the buildings and shall not be exposed to the elements.
21. LED fixtures shall be UL/ETL Listed.
22. Manufacturer shall be able to provide supporting documentation of the product meeting third party regulatory compliance.
23. Manufacturer shall provide photometric data in IES file format in accordance with IES LM-63-2002, based on test results from an independent testing lab upon request.
24. Manufacturer shall provide optical performance, polar diagrams, and relevant luminance and illuminance photometric data based on test results from an independent testing lab.
25. Manufacturer shall provide installation guides.
26. Manufacturer shall provide system wiring diagrams.
27. Manufacturer shall provide a factory-trained applications engineer for on-site supervision of start-up upon request.
28. White LED sources must meet the following requirements:
    a. Luminaires must be rated for -40°C to +50°C operation
    b. Correlated Color Temperature (CCT) shall be one of the following, as selected by Owner:
        1) Nominal CCT: 4000 K (3985 ± 50)
    c. Duv tolerance of 0.001 ± 0.006
    d. Color Rendering Index (CRI): ≥ 80
    e. Luminaire manufacturer must submit reliability reports indicating that the manufacturer of the LED (chip, diode, or package) has performed JEDEC (Joint Electron Devices Engineering Council) reliability tests on the LEDs as follows:
        1) High Temperature Operating Life (HTOL)
        2) Room Temperature Operating Life (RTOL)
        3) Low Temperature Operating Life (LTOL)
        4) Powered Temperature Cycle (PTMCL)
        5) Non-Operating Thermal Shock (TMSK)
        6) Mechanical shock
        7) Variable vibration frequency
        8) Solder Heat Resistance (SHR)
29. Acceptable LED chip manufacturers:

a. Osram
b. Philips
c. Nichia
d. Cree
e. Seoul Semi-Conductor
f. Xicato
g. Bridgelux

30. Acceptable fixture manufacturers or approved equal:
    a. Subject to written approval.

S. Custom Fixtures: Provide complete custom fixture assemblies as indicated on architectural drawings and as indicated herein.
   1. Metal Work: Provide all metal work for custom fixtures in accordance with the quality and standards specified in Section, Ornamental Metal. Coordinate shop drawings for custom fixtures with that of adjacent trades for mounting of fixtures.

T. Instructions: Each lighting fixture shall be packaged with complete installation instructions and illustrations.

2.1 FIXTURE TYPES:

A. General: Fixture types, quantities, etc., are described in this Specification, shown on the Drawings and delineated by the details.

B. Fixture Designation: Each fixture type is designated by a letter or alphanumeric symbol as indicated on the Drawings, and as described herein.

C. Fixture Type Schedule: All specific information regarding each fixture type is provided in Architectural Fixture Cut Sheets, Section 26 51 02 & 26 51 03. The Luminaire Schedule indicates manufacturer, fixture description, lamp code, remarks and approved alternate fixture manufacturers.

PART 3 - EXECUTION

2.2 EXAMINATION:

A. Verification of Conditions: Examine the areas to receive Work and the conditions under which the Work would be performed. Subcontractor shall remedy conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

2.3 INSTALLATION:

A. Provide all mounting hardware and accessories as required for ceiling construction type indicated on the plans and schedules. Fixture catalog numbers do not necessarily denote specific mounting accessories for type of ceiling in which a fixture may be installed.

B. Provide adequate and sturdy support for each lighting fixture, as shown on the detail Drawings. Provide all appurtenances required for the proper, safe and distortion-free installation of all fixtures in the various surfaces in which they appear. Determine surface types from the Drawings.

C. Install lighting fixtures in strict accordance with the Manufacturer's recommendations and instructions.

D. Install fixtures with vent holes free of air blocking obstacles.

E. Install pendant fixtures plumb, and at a height above the floor, as specified on the Drawings.

F. Fixtures shall be carefully aligned, leveled in straight lines, and located as shown on the architectural reflected ceiling plan. The final decision as to adequacy of support and alignment, shall be given by the Architect.

G. Recessed fixtures shall have trims which fit neatly and tightly to the surfaces in which they are installed without leaks or gaps.

H. All fixtures, once lamped and tested, shall remain off for the duration of construction. Fixtures shall not be used as construction work lights by the Subcontractor for any duration of time. If there is evidence to the contrary then at the discretion of the Architect, all fixtures shall be re-lamped with new lamps at the conclusion of construction, at no additional cost to the Owner.

I. Do not install fixture parts such as: finishing plates; trims; reflector cones; baffles; aperture plates; light controlling elements for air-handling fixtures; or decorative elements, until after plastering, painting, completions of ceiling tiles, other work that may mar fixtures, and general cleanup, has been completed.

J. Fixtures shall be left clean at the time of acceptance of the work with every lamp in operation. If fixtures are deemed dirty by the Architect at completion of the project, the Subcontractor shall clean them at no additional cost to the Owner.

K. Fixtures shall be aimed or installed to provide the lighting pattern for which the fixture is designed.

2.4 LOCATION:

A. Locations of fixtures are shown diagrammatically. Verify exact quantities, location and spacing with the Drawings and other reference data before ordering of fixtures and during installation.

B. Notify Architect about field conditions at variance with Contract Documents before commencing installation.

C. Coordinate space conditions with all other applicable trades before ordering of fixtures.

2.5 WIRING:

A. See Drawings and specifications for exact wiring requirements for all fixture types.

B. All wire utilized for connections to or between individual lamp sockets and lamp auxiliaries (i.e., wires which do not constitute through circuit wiring), must be suitable for temperature, current, and voltage conditions to which it is subjected.

C. Splices in internal wiring, shall be made in accordance with the requirements of the specifications, suitable for the temperature and voltage conditions to which they are subjected.

2.6 ANCHORAGE TO STRUCTURE:

A. Steel Structural Members: Anchor with "C" form flange clamps.

B. Concrete Structure: Type of anchorage to be reviewed for appropriateness by the Architect.

C. Suspended Plaster or GWB Ceilings: Anchor to main channel runners.

D. Support all fixtures independently of duct-work or piping.

2.7 AIMING, ADJUSTMENT AND PUNCH LISTING:

A. Aiming and Adjustment: Provide labor and materials for final aiming and focusing of all adjustable fixtures under the Architect's supervision. All aiming and adjusting shall be carried out, after the entire installation is complete, unless otherwise approved by the architect due to construction scheduling. The Subcontractor shall provide the personnel and equipment for this task, in accordance with all applicable union agreements. All aiming and adjusting shall be per the direction of the Architect. As aiming and adjusting is completed, locking set screw, and nuts and bolts shall be tightened securely.

B. Night Work: Where possible, fixtures shall be focused during the normal working day; however, where daylight interferes with: aiming; or the ability of the Architect to ascertain illumination levels; aiming shall be accomplished at night, at no additional cost to the Owner.

C. Punch Listing: During aiming and focusing the Architect shall punch list the work.

D. Timing: Aiming and adjusting shall be appropriately scheduled by the Subcontractor, so as to allow for sufficient time to correct punch list items observed, and if necessary additional aiming and adjusting, prior to occupancy by the Owner.

2.8 CLEANUP:

A. At the time of final acceptance by the Owner all lighting fixtures shall have been thoroughly cleaned with materials and methods as recommended by the Manufacturer; all broken parts shall have been replaced; and all lamps shall be operative.

END OF SECTION 26 51 01

SECTION 26 51 02 – ARCHITECTURAL EXTERIOR LIGHTING CUTSHEETS

Type	Issue Date
S201	February 12, 2016
S202	February 12, 2016
S203A	February 12, 2016
S203B	February 12, 2016
S204	February 12, 2016
S205	February 12, 2016
S206	February 12, 2016
S207	February 12, 2016
S208	February 12, 2016
S209A	February 12, 2016
S209B	February 12, 2016
S210	February 12, 2016
S211	February 12, 2016
S212	February 12, 2016
S213	February 12, 2016

Project Number:	Sandy Springs City Center	Type: **S201**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 1 of 4

SP 6.0 RIBBONLYTE

RoHS Compliant

24 Volt

Constant voltage

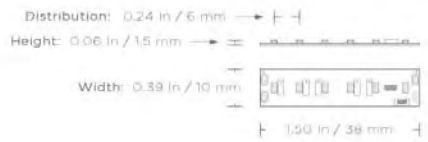
6.0 Watts per foot, 48 LEDs per foot

IP65 and IP68 versions are UV resistant

3000K, 4100K, 6000K

Cuttable every 1.50 in (38.0 mm)

DIMENSIONS



PART NUMBER BUILDER

Category		CRI		Waterproof		Voltage		Wattage		Color / Temp.		
RBSP	+		+		+	24	+	6.0	+		=	Your Part Number
		Blank - Regular HI - High CRI		65 - IP65 68 - IP68 Blank - None (IP20)						30 - 3000K 41 - 4100K 60 - 6000K		Example: RBSP246.030

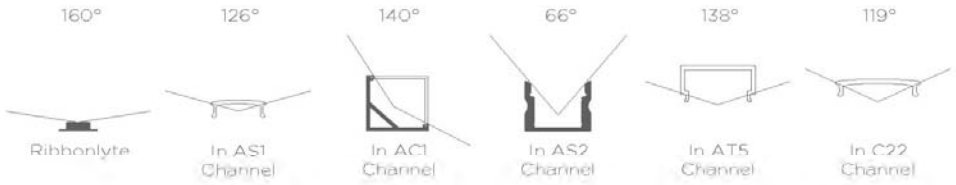
ACOLYTE LED 251 West 30th St, Suite 12E New York, NY 10001 212.629.6830 INFO@ACOLYTELED.COM

CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	Acolyte "SP 6.0 Ribbonlyte"
	Specification:	RBSP-IP65-24-6-30/ CH-AS1-CONTINUOUS LENGTHS PER ARCH'L DWGS-F-CHCAPAS10-CHLENSAS1F/CHMNTAS1M
	Lamp Type:	Integral to fixture
	Approved Alternates:	Tivoli Lighting, Tokistar, Moda Lighting

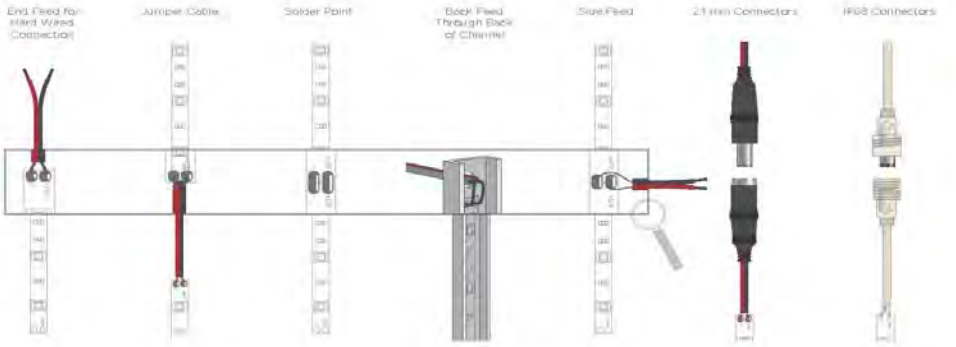
Project Number:	Sandy Springs City Center	Type: **S201**
15.54.0	Alpharetta, GA	
12-Feb-16		Page: 2 of 4

SP 6.0 RIBBONLYTE

SAMPLE BEAM ANGLES



CONNECTION OPTIONS



CHANNEL COMPATIBILITY

Protection	Compatible Channels
Non-Waterproof (IP20) + IP65	All Channel
IP68	AC1, AC2, AC4, AC5, AR3, AS3, AS6, AT1, AT2, AT4, AT5, AT11, C22, AP1, GL1

Rev. 2013.11.20

ACOLYTE LED 251 West 30th St, Suite 12E New York, NY 10001 212.629.6830 INFO@ACOLYTELED.COM 3

CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	Acolyte "SP 6.0 Ribbonlyte"
	Specification:	RBSP-IP65-24-6-30/ CH-AS1-CONTINUOUS LENGTHS PER ARCH'L DWGS-F-CHCAPAS10-CHLENSAS1F/CHMNTAS1M
	Lamp Type:	Integral to fixture
	Approved Alternates:	Tivoli Lighting, Tokistar, Moda Lighting

Project Number: 15.54.0 12-Feb-16	Sandy Springs City Center Alpharetta, GA	Type: **S201** Page: 3 of 4

CHANNEL AS1

Available in 1 and 2 meter lengths

118° beam angle

UV resistant

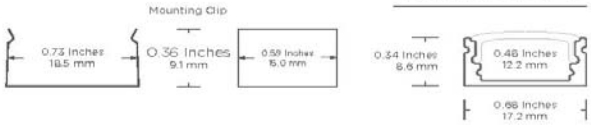
Mounting clips available

IP20 grade aluminum

End caps provide a finished look to the fixture

Powdercoating available - will match color or use RAL #

DIMENSIONS



PART NUMBER BUILDER for purchasing channel individually

Category		Model		Length		Lens		
CH	+	AS1	+		+		=	Your Part Number Example: CHAS12F
				1 - 1 Meter 2 - 2 Meter		Blank - None M - Milky 70% F - Frosted 85% C - Clear 92%		

PART NUMBER BUILDER for purchasing channel and ribbonlyte as a package

Category		Channel Model		Channel Lens		LED Voltage		LED Waterproof Rating	
CH	+	AS1	+		+		+		+
				Blank - None M - Milky 70% F - Frosted 85% C - Clear 92%		12 - 12 Volts 24 - 24 Volts		Blank - None 65 - IP65 68 - IP68	

LED Wattage		LED Color (Temp.)		Length		
	+		+		=	Your Part Number Example: CHAS1M124.42410
See RibbonLyte Section for Available Wattages		See RibbonLyte Section for Available Colors and Color Temperatures		Your Desired Length in Feet		

Rev. 2015.04.10

ACOLYTE LED 251 West 30th St, Suite 12E New York, NY 10001 212.629.6830 INFO@ACOLYTELED.COM 1

Manufacturer:	Acolyte "SP 6.0 Ribbonlyte"
Specification:	RBSP-IP65-24-6-30/ CH-AS1-CONTINUOUS LENGTHS PER ARCH'L DWGS-F-CHCAPAS10-CHLENSAS1F/CHMNTAS1M
Lamp Type:	Integral to fixture
Approved Alternates:	Tivoli Lighting, Tokistar, Moda Lighting

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Project Number:	Sandy Springs City Center	Type: **S201**
15.54.0		
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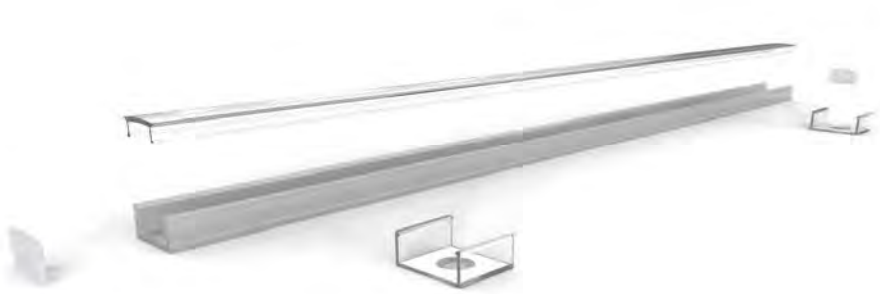
CHANNEL AS1



ACCESSORIES FOR AS1

End Cap With Wiring Hole
CHCAPAS10

End Cap Without Hole
CHCAPAS1

Milky Lens
CHLENSAS1IM
CHLENSAS12M

Frosted Lens
CHLENSAS1IF
CHLENSAS12F

Clear Lens
CHLENSAS1IC
CHLENSAS12C

Mounting Clip
CHMNTAS1

Metal Mounting Clip
CHMNTAS1M

Tiltable Stand
TILTSTAND

RIBBONLYTE COMPATIBILITY

The following RibbonLyte will fit in AS1 channel:

Non-Waterproof (IP20 + IP65)	Static White:	1.5	2.2	3.0	4.4	5.0
	Variable White:	3.0				
	Static Color:	1.5	2.2	3.0	4.4	5.0
	RGB:	2.2	4.4	RGBW	RGBA	
IP68	Static White:	1.5	3.0			
	Variable White:	3.0				
	Static Color:	1.5	3.0			
	RGB:	---				

Rev. 2015.04.10

ACOLYTE LED 251 West 30th St, Suite 12E New York, NY 10001 212.629.6830 INFO@ACOLYTELED.COM 2

Manufacturer:	Acolyte "SP 6.0 Ribbonlyte"
Specification:	RBSP-IP65-24-6-30/ CH-AS1-CONTINUOUS LENGTHS PER ARCH'L DWGS-F-CHCAPAS10-CHLENSAS1F/CHMNTAS1M
Lamp Type:	Integral to fixture
Approved Alternates:	Tivoli Lighting, Tokistar, Moda Lighting

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Project Number:	Sandy Springs City Center	Type: **S202**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 1 of 1

Wall luminaires with double-sided light output

Housing: Extruded and die cast aluminum. Mounts directly to a BEGA 537 box (provided). Die castings are marine grade, copper free (≤ 0.3% copper content) A360.0 aluminum alloy.

Enclosure: Tempered clear glass, the bottom and top diffuser are flush to the die casting to prevent water accumulation. Fully gasketed for weather tight operation using a 'U' channel molded silicone rubber gasket.

Electrical: 26W LED luminaire, 28.2 total system watts, -30°C start temperature. Integral 120V through 277V electronic LED driver, 0-10V dimming. LED module(s) are available from factory for easy replacement. Standard LED color temperature is 3000K with an 85 CRI. Available in 4000K (85 CRI); add suffix K4 to order.

Notes: LEDs supplied with luminaire. Due to the dynamic nature of LED technology, LED luminaire data on this sheet is subject to change at the discretion of BEGA-US. For the most current technical data, please refer to www.bega-us.com.

Finish: All BEGA standard finishes are polyester powder coat with minimum 3 mil thickness. Available in four standard BEGA colors: Black (BLK); White (WHT); Bronze (BRZ); Silver (SLV). To specify, add appropriate suffix to catalog number. Custom colors supplied on special order.

CSA certified to U.S. and Canadian standards for wet locations.
Protection class IP65

Weight: 7.5 lbs

Luminaire Lumens: 910
Tested in accordance with LM-79-08

Mounting options:

547 Surface-mount wiring box

Type:
BEGA Product:
Project:
Voltage:
Color:
Options:
Modified:

These luminaires mount over a custom BEGA recessed box. This box can be shipped ahead of the luminaire.

Narrow beam in both directions

Lamp	β	A	B	C	D	Wiring box*
6516LED.537* 26W LED	14°	4¾	19⅝	6⅛	1⅛	**537**

β = Beam angle *Small opening wiring box included.

BEGA-US 1000 BEGA Way, Carpinteria, CA 93013 (805) 684-0533 FAX (805) 566-9474 www.bega-us.com
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Manufacturer:	Bega "6516"
Specification:	6516LED537*
Lamp Type:	Integral to fixture
Approved Alternates:	Winona, BK Lighting, Lumascape

CD+M Lighting Design Group
www.cdmlight.com

Project Number:	Sandy Springs City Center	Type: **S203A**
15.54.0		
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ECOSENSE

TROV

OVERVIEW • SPECIFICATIONS

INTERIOR + EXTERIOR | L50 GRAZE

DATE | PROJECT | FIRM | TYPE

THE L50 INCLUDES PATENTED OPTICAL DESIGN THAT DELIVERS THE WIDEST RANGE OF BEAM ANGLE OPTIONS FOR PRECISE COVE, WALL GRAZING, WALL WASHING OR LINE OF LIGHT APPLICATIONS. EXCLUSIVE FLIP TO FLAT™ HINGE DESIGN PROVIDES FLEXIBILITY WHEN MANAGING SMALL COVE DETAILS. TROV OFFERS SMOOTH, FLICKER FREE DIMMING DOWN TO 0%.

FEATURES :

- DIM TO 0%, ELV REVERSE PHASE
- 24 BEAM ANGLES
- MULTI-VOLT
- FLIP TO FLAT™
- 6 CCT OPTIONS
- 80+ AND 90+ CRI OPTIONS
- IP54 INTERIOR AND IP66 EXTERIOR OPTIONS

PERFORMANCE	WATTS	CCT*	OPTIC	LUMEN OUTPUT	EFFICACY
	2W	4000K	9"x 29"	110 lm/LF (361 lm/m)	55 lm/W
	4W	4000K	9"x 29"	316 lm/LF (1037 lm/m)	79 lm/W
	6W	4000K	9"x 29"	492 lm/LF (1614 lm/m)	82 lm/W
	8W	4000K	9"x 29"	678 lm/LF (2224 lm/m)	85 lm/W
	10W	4000K	9"x 29"	806 lm/LF (2644 lm/m)	81 lm/W

* MORE CCT, POWER, AND OPTIC OPTIONS ON PAGE 2. ALL LUMEN DATA IS FROM 80CRI FIXTURES. PLEASE SEE PHOTOMETRY SPEC SHEET FOR ADDITIONAL LUMEN DATA.

COLOR RENDERING INDEX	80+, 90+
COLOR CONSISTENCY	2-STEP MACADAM ELLIPSE
LUMEN DEPRECIATION / RATED LIFE	WATTS | L70 @ 25C | L70 @ 50C | L90 @ 25C | L90 @ 50C 2W-10W | >150,000 | >70,000 | >50,000 | >25,000

* CALCULATIONS FOR LED FIXTURES ARE BASED ON MEASUREMENTS THAT COMPLY WITH IES LM-80 TESTING PROCEDURES AND IES TM-21 CALCULATOR

ELECTRICAL

POWER CONSUMPTION: 2W*/LF (6.6W/M) ; 4W/LF (13.2W/M) ; 6W/LF (19.8W/M) ; 8W/LF (26.4W/M) ; 10W/LF (33W/M)
* 3W/LF (9.9W/M) at 220V -277V

MAX FIXTURE RUN LENGTH

	2W/LF		4W/LF		6W/LF		8W/LF		10W/LF	
Volts	Max Run all (')	Max Run all (')	Max Run all (')	Max Run all (')	Max Run all (')	Max Run all (')	Max Run all (')	Max Run all (')	Max Run all (')	Max Run all (')
120	214	214	186	186	152	152	114	114	91	91
220	374	392	340	340	277	277	209	209	95	167
277	374	494	374	428	349	349	263	263	95	190

POWER FACTOR	4W, 6W, 8W, 10W >0.9, 2W<0.9
OPERATING VOLTAGE	MULTIVOLT: 110-277VAC, 50/60 Hz
DRIVER	INTEGRAL TO FIXTURE: DE-RATED POWER AND SYNCHRONOUS START-UP AT FULL BRIGHTNESS
STARTUP TEMPERATURE	-40°F TO 122°F (-40°C TO 50°C)
OPERATING TEMPERATURE	-40°F TO 122°F (-40°C TO 50°C)
STORAGE TEMPERATURE	-40°F TO 176°F (-40°C TO 80°C)

CONTROL	DIMMING	110-277VAC, ELV TYPE 0.07%-100%, REVERSE PHASE, TRAILING EDGE
PHYSICAL	DIMENSIONS	W 1.6" x H 2" x L 12'/48" | (41.6mm x 50.5mm x 304.7mm/1201mm)
	HOUSING /LENS	EXTRUDED ALUMINUM, CLEAR POLYCARBONATE, STAINLESS STEEL FASTENERS, PLASTIC ENDCAPS RUBBER OVERMOLD FOR CABLE ASSEMBLY
	WEIGHT	1.52LBS. / 0.69KG (1FT) ; 4.95LBS. / 2.25KG (4FT)
	CONNECTORS	INTEGRAL MALE/ FEMALE CONNECTORS
	ENVIRONMENT	INDOOR • ETL CERTIFIED FOR DRY/DAMP LOCATIONS IP54 OUTDOOR • ETL CERTIFIED FOR WET LOCATIONS IP66
	BEAM ANGLE	GRAZING, WASHING, COVE, ASYMETRIC, LINE OF LIGHT
	MOUNTING OPTIONS	INTEGRAL MOUNTING AND ADJUSTABLE AIMING FROM 0°-180° IN 15° INCREMENTS
FIXTURE RATING & CERTIFICATIONS	CE, ETL CERTIFIED RoHS COMPLIANT	CE ETL Intertek RoHS
LIMITED WARRANTY	5 YEARS	

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Manufacturer:	Ecosense
Specification:	L50-E-48" (12" at end of run only)-04-30-80-MLT-9x29-CBL-3P-L-UNV-10-LDCM-PL-120-277-010V-GR-MNT-L-FAB-LENS-L50-CLEAR-48
Lamp Type:	Integral to fixture
Approved Alternates:	Color Kinetics, Lumenpulse, Winona

CD+M Lighting Design Group
www.cdmlight.com

Project Number: 15.54.0 12-Feb-16	Sandy Springs City Center Alpharetta, GA	Type: **S203A** Page: 2 of 3

ECOSENSE

TRŌV

ORDERING | INTERIOR + EXTERIOR | L50 GRAZE

DATE | PROJECT | FIRM | TYPE

MODEL/ SIZE	INTERIOR/ EXTERIOR	LENGTH	POWER	CCT		CRI	VOLTAGE	OPTICS	
L50	I E	12" 48"	02 04 06 08 10	WHITE CCT 22 27 30 35 40 50	MONO COLOR RD GR BL AM	80 90* Blank for color	MULT (110-277VAC)	GRAZING 9 x 29 9 x 59 15 x 15 15 x 23 15 x 35 15 x 65	WASHING 25 x 25 40 x 48 25 x 33 40 x 60 25 x 45 40 x 90 25 x 75 45 x 15 39 x 9 70 x 40 55 x 25 70 x 70 40 x40
								COVE 120** Asym	LINE OF LIGHT LOL

EXAMPLE L50-I-48-10-27-90-MULT-15x65

*90 CRi not available in 2200K or 5000K. **120 is only available with Exterior option. See L35 spec sheet for interior cove options.

WIRING OPTIONS (MVOLT): 110-277VAC

Power Cable Assembly, TROV, Leader/Jumper, 10 foot CBL-3P-L-UNV-10*
Power Cable Assembly, TROV, Jumper, 5 foot CBL-3P-L-UNV-05**
Power Cable Assembly, TROV, Jumper, 1 foot CBL-3P-L-UNV-01**
Power Cable Assembly, TROV, Male and Female terminator caps CBL-3P-L-UNV-CAPS

*Two (2) terminators are included with the 10' power cable. One Leader need per circuit/fixture run. Cables are not plenum rated.
** If using the 5' or 1' power cable assembly as a leader to power a run one set of CBL-3P-L-UNV-CAPS will also be need per cable.

0-10V CONTROL OPTIONS

100-120VAC / 277VAC Linear Dimming Control Module 0-10V - Plenum Rated LDCM-PL-120-277-010V-GR

All products come standard with ELV dimming capabilities. 0-10V Control options required for operation at 0-10V.

OPTIONAL ACCESSORIES

Mounting

Mounting Track, TROV, 48 inch ..... MNT-L-TRK-48 ..... Mounting Track needed = Total run length. Mounting track is field cuttable.
Mounting Track, TROV, 12 inch ..... MNT-L-TRK-12 ..... Track can be continuously mounted and have any length fixture attach to it.
Mounting Track Clip, TROV, Set of 2 ..... MNT-L-CLIP ..... Clips needed = 12" fixtures need 1 set of 2 and 48" fixture needs 2 sets of 2.
90 Degree L bracket, TROV, Set of 2 ..... MNT-L-LBKT ..... L-Brackets needed = 12" fixtures need 1 set of 2 and 48" fixture needs 2 sets of 2.
Angle Locking Clip, TROV, Pack of 10 ..... MNT-L-ANGLOCK ..... Angle Locks needed = 12" fixtures need 1 and 48" fixtures need 2.
Mounting, Fine Adjustment Bracket, TROV ..... MNT-L-FAB* ..... Fine Adjustment Brackets needed = 12" fixtures need 1 and 48" fixtures need 2.

*Fine Adjustment Bracket is highly recommended for Grazing Optics.

Snap-on Lenses

Snap-on Lens, Frosted, 12 inch, L50 ..... LENS-L50-FROST-12
Snap-on Lens, Frosted, 48 inch, L50 ..... LENS-L50-FROST-48
Snap-on Lens, Clear, 12 inch, L50 ..... LENS-L50-CLEAR-12
Snap-on Lens, Clear, 48 inch, L50 ..... LENS-L50-CLEAR-48

Snap-on Lenses need = One 12" lens is needed per 12" fixture and one 48" lens is needed per 48" fixture. Snap on Lenses will not work with the asymmetric fixture. Clear lenses can be used to hold colored filters to customize the output color of any TROV fixture, except the ASYM. Color filters supplied by others.

Wall Mount Arm

Wall Mount Arm, 6 inch, TROV WMA-L-CA-06
Wall Mount Arm, 12 inch, TROV WMA-L-CA-12
Wall Mount Arm, 18 inch, TROV WMA-L-CA-18
Wall Mount Arm, 24 inch, TROV WMA-L-CA-24
Wall Mount Arm End Plate Set, TROV, Includes Left and Right ..... WMA-L-END
Wall Mount Arm Joiner Plate, TROV ..... WMA-L-JNR

Wall Mount Arms needed = For individual fixture installations two arms and one end set Will be needed per fixture. For continuous run installation one endset will be needed per run. Each end set contains one left and one right end plate. One joining set will be needed per joint. One arm per fixture will be need plus one extra arm to complete the run. For example: A 10ft run made with two 4ft and two 1ft fixtures will contain: 1 x WMA-L-END, 3 x WMA-L-JNR, and 5 x WMA-L-CA-12. Leader cables are not included with wall mount arms, end sets, or joiners sets.

Louvers

Louver, Asymmetric, 12 inch, L50 ..... LV-L50-ASYM-12
Louver, Asymmetric, 48 inch, L50 ..... LV-L50-ASYM-48
Louver, Symmetric, 12 inch, L50 ..... LV-L50-SYM-12
Louver, Symmetric, 48 inch, L50 ..... LV-L50-SYM-48
Louver, Honeycomb, 12 inch, L50 ..... LV-L50-HCOMB-12
Louver, Honeycomb, 48 inch, L50 ..... LV-L50-HCOMB-48

Louvers Needed = One 12" louver is needed per 12" fixture and one 48" louver is needed per 48" fixture. 48" louver is made up of four 12" louvers. Louvers cannot be used with the asymmetric fixture.

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CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	Ecosense
	Specification:	L50-E-48" (12" at end of run only)-04-30-80-MLT-9x29-CBL-3P-L-UNV-10-LDCM-PL-120-277-010V-GR-MNT-L-FAB-LENS-L50-CLEAR-48
	Lamp Type:	Integral to fixture
	Approved Alternates:	Color Kinetics, Lumenpulse, Winona

Project Number:	Sandy Springs City Center	Type: **S203A**
15.54.0	Alpharetta, GA	
12-Feb-16		Page: 3 of 3

ECOSENSE

TROV

ORDERING

INTERIOR + EXTERIOR | L50 GRAZE

DATE | PROJECT | FIRM | TYPE

OPTIONAL ACCESSORIES

Masking Plates

Masking Plate, 3 inch high, 12 inch, L50 & L35 ..... MP-L50-3H-12
Masking Plate, 3 inch high, 48 inch, L50 & L35 ..... MP-L50-3H-48

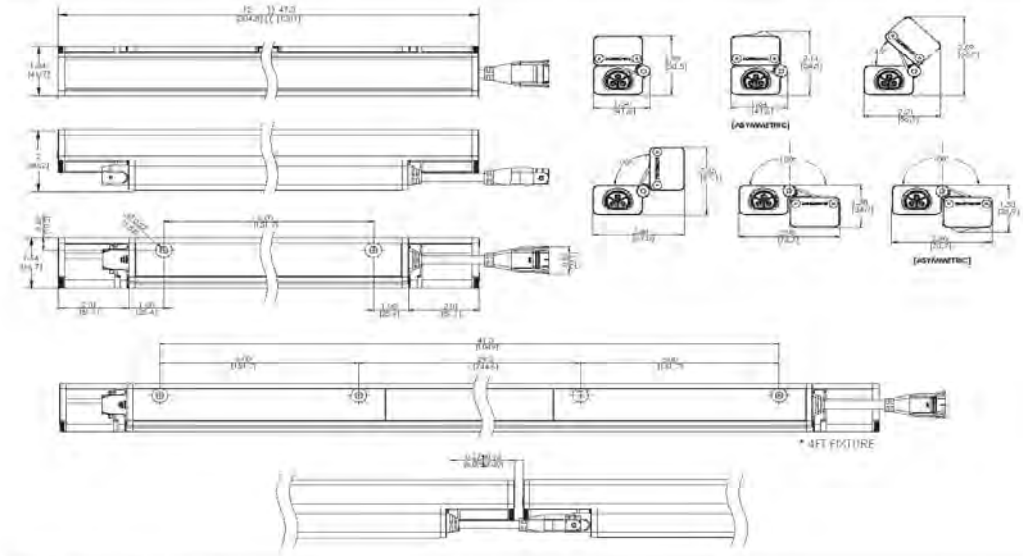
Masking Plates needed = One 12" lens is needed per 12" fixture and one 48" lens is needed per 48" fixture.

Landscape Stake

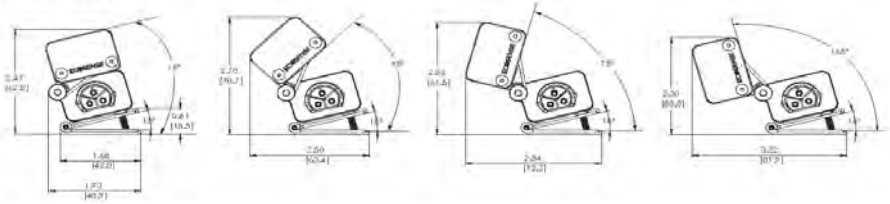
Landscape Stake, 6 inch, TROV, Set of 2 ..... LS-L-STK-06
Landscape Stake, 12 inch, TROV, Set of 2 ..... LS-L-STK-12
Landscape Stake, 18 inch, TROV, Set of 2 ..... LS-L-STK-18

Landscape Stakes needed = 12" and 48" fixtures both need one set of 2

DIMENSIONS + MOUNTING



Fine Adjustable Bracket:



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CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	Ecosense
	Specification:	L50-E-48" (12" at end of run only)-04-30-80-MLT-9x29-CBL-3P-L-UNV-10-LDCM-PL-120-277-010V-GR-MNT-L-FAB-LENS-L50-CLEAR-48
	Lamp Type:	Integral to fixture
	Approved Alternates:	Color Kinetics, Lumenpulse, Winona

Project Number:	Sandy Springs City Center	Type: **S203B**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 1 of 3

ECOSENSE

TROV

OVERVIEW • SPECIFICATIONS

INTERIOR + EXTERIOR | L50 GRAZE

DATE | PROJECT | FIRM | TYPE

THE L50 INCLUDES PATENTED OPTICAL DESIGN THAT DELIVERS THE WIDEST RANGE OF BEAM ANGLE OPTIONS FOR PRECISE COVE, WALL GRAZING, WALL WASHING OR LINE OF LIGHT APPLICATIONS. EXCLUSIVE FLIP TO FLAT™ HINGE DESIGN PROVIDES FLEXIBILITY WHEN MANAGING SMALL COVE DETAILS. TROV OFFERS SMOOTH, FLICKER FREE DIMMING DOWN TO 0%.

FEATURES :

- DIM TO 0%, ELV REVERSE PHASE
- 24 BEAM ANGLES
- MULTI-VOLT
- FLIP TO FLAT™
- 6 CCT OPTIONS
- 80+ AND 90+ CRI OPTIONS
- IP54 INTERIOR AND IP66 EXTERIOR OPTIONS

PERFORMANCE	WATTS	CCT*	OPTIC	LUMEN OUTPUT	EFFICACY
	2W	4000K	9"x 29"	110 lm/LF (361 lm/m)	55 lm/W
	4W	4000K	9"x 29"	316 lm/LF (1037 lm/m)	79 lm/W
	6W	4000K	9"x 29"	492 lm/LF (1614 lm/m)	82 lm/W
	8W	4000K	9"x 29"	678 lm/LF (2224 lm/m)	85 lm/W
	10W	4000K	9"x 29"	806 lm/LF (2644 lm/m)	81 lm/W

* MORE CCT, POWER, AND OPTIC OPTIONS ON PAGE 2. ALL LUMEN DATA IS FROM 80CRI FIXTURES. PLEASE SEE PHOTOMETRY SPEC SHEET FOR ADDITIONAL LUMEN DATA.

COLOR RENDERING INDEX	80+, 90+
COLOR CONSISTENCY	2-STEP MACADAM ELLIPSE
LUMEN DEPRECIATION / RATED LIFE	WATTS | L70 @ 25C | L70 @ 50C | L90 @ 25C | L90 @ 50C 2W-10W | >150,000 | >70,000 | >50,000 | >25,000

* CALCULATIONS FOR LED FIXTURES ARE BASED ON MEASUREMENTS THAT COMPLY WITH IES LM-80 TESTING PROCEDURES AND IES TM-21 CALCULATOR

ELECTRICAL

POWER CONSUMPTION: 2W*/LF (6.6W/M) ; 4W/LF (13.2W/M) ; 6W/LF (19.8W/M) ; 8W/LF (26.4W/M) ; 10W/LF (33W/M)
* 3W/LF (9.9W/M) at 220V -277V

MAX FIXTURE RUN LENGTH

	2W/LF		4W/LF		6W/LF		8W/LF		10W/LF	
Volts	Max Run all (')	Max Run all (')	Max Run all (')	Max Run all (')	Max Run all (')	Max Run all (')	Max Run all (')	Max Run all (')	Max Run all (')	Max Run all (')
120	214	214	186	186	152	152	114	114	91	91
220	374	392	340	340	277	277	209	209	95	167
277	374	494	374	428	349	349	263	263	95	190

POWER FACTOR	4W, 6W, 8W, 10W >0.9, 2W<0.9
OPERATING VOLTAGE	MULTIVOLT: 110-277VAC, 50/60 Hz
DRIVER	INTEGRAL TO FIXTURE: DE-RATED POWER AND SYNCHRONOUS START-UP AT FULL BRIGHTNESS
STARTUP TEMPERATURE	-40°F TO 122°F (-40°C TO 50°C)
OPERATING TEMPERATURE	-40°F TO 122°F (-40°C TO 50°C)
STORAGE TEMPERATURE	-40°F TO 176°F (-40°C TO 80°C)

CONTROL	DIMMING	110-277VAC, ELV TYPE 0.07%-100%, REVERSE PHASE, TRAILING EDGE
PHYSICAL	DIMENSIONS	W 1.6" x H 2" x L 12'/48" | (41.6mm x 50.5mm x 304.7mm/1201mm)
	HOUSING /LENS	EXTRUDED ALUMINUM, CLEAR POLYCARBONATE, STAINLESS STEEL FASTENERS, PLASTIC ENDCAPS, RUBBER OVERMOLD FOR CABLE ASSEMBLY
	WEIGHT	1.52LBS. / 0.69KG (1FT.) ; 4.95LBS. / 2.25KG (4FT.)
	CONNECTORS	INTEGRAL MALE/ FEMALE CONNECTORS
	ENVIRONMENT	INDOOR • ETL CERTIFIED FOR DRY/DAMP LOCATIONS IP54 OUTDOOR • ETL CERTIFIED FOR WET LOCATIONS IP66
	BEAM ANGLE	GRAZING, WASHING, COVE, ASYMETRIC, LINE OF LIGHT
	MOUNTING OPTIONS	INTEGRAL MOUNTING AND ADJUSTABLE AIMING FROM 0°-180° IN 15° INCREMENTS
FIXTURE RATING & CERTIFICATIONS	CE, ETL CERTIFIED RoHS COMPLIANT	CE ETL Intertek RoHS
LIMITED WARRANTY	5 YEARS	

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Manufacturer:	Ecosense
Specification:	L50-E-48" (12" at end of run only)-10-30-80-MLT-9x29-CBL-3P-L-UNV-10-LDCM-PL-120-277-010V-GR-MNT-L-FAB-LENS-L50-CLEAR-48
Lamp Type:	Integral to fixture
Approved Alternates:	Color Kinetics, Lumenpulse, Winona

CD+M Lighting Design Group
www.cdmlight.com

Project Number: 15.54.0 12-Feb-16	Sandy Springs City Center Alpharetta, GA	Type: **S203B** Page: 2 of 3

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ORDERING | INTERIOR + EXTERIOR | **L50 GRAZE**

DATE | PROJECT | FIRM | TYPE

MODEL/ SIZE	INTERIOR/ EXTERIOR	LENGTH	POWER	CCT		CRI	VOLTAGE	OPTICS	
L50	I E	12" 48"	02 04 06 08 10	WHITE CCT 22 27 30 35 40 50	MONO COLOR RD GR BL AM	80 90* Blank for color	MULT (110-277VAC)	GRAZING 9 x 29 9 x 59 15 x 15 15 x 23 15 x 35 15 x 65	WASHING 25 x 25 40 x 48 25 x 33 40 x 60 25 x 45 40 x 90 25 x 75 45 x 15 39 x 9 70 x 40 55 x 25 70 x 70 40 x40
								COVE 120** Asym	LINE OF LIGHT LOL

EXAMPLE L50-I-48-10-27-90-MULT-15x65

*90 CRi not available in 2200K or 5000K **120 is only available with Exterior option. See L35 spec sheet for interior cove options.

WIRING OPTIONS (MVOLT): 110-277VAC

Power Cable Assembly, TROV, Leader/Jumper, 10 foot CBL-3P-L-UNV-10*
Power Cable Assembly, TROV, Jumper, 5 foot CBL-3P-L-UNV-05**
Power Cable Assembly, TROV, Jumper, 1 foot CBL-3P-L-UNV-01**
Power Cable Assembly, TROV, Male and Female terminator caps CBL-3P-L-UNV-CAPS

*Two (2) terminators are included with the 10' power cable. One Leader need per circuit/fixture run. Cables are not plenum rated.
** If using the 5' or 1' power cable assembly as a leader to power a run one set of CBL-3P-L-UNV-CAPS will also be need per cable.

0-10V CONTROL OPTIONS

100-120VAC / 277VAC Linear Dimming Control Module 0-10V - Plenum Rated LDCM-PL-120-277-010V-GR

All products come standard with ELV dimming capabilities. 0-10V Control options required for operation at 0-10V.

OPTIONAL ACCESSORIES

Mounting

Mounting Track, TROV, 48 inch ..... MNT-L-TRK-48 ..... Mounting Track needed = Total run length. Mounting track is field cuttable.
Mounting Track, TROV, 12 inch ..... MNT-L-TRK-12 ..... Track can be continuously mounted and have any length fixture attach to it.
Mounting Track Clip, TROV, Set of 2 ..... MNT-L-CLIP ..... Clips needed = 12" fixtures need 1 set of 2 and 48" fixture needs 2 sets of 2.
90 Degree L bracket, TROV, Set of 2 ..... MNT-L-LBKT ..... L-Brackets needed = 12" fixtures need 1 set of 2 and 48" fixture needs 2 sets of 2.
Angle Locking Clip, TROV, Pack of 10 ..... MNT-L-ANGLOCK ..... Angle Locks needed = 12" fixtures need 1 and 48" fixtures need 2.
Mounting, Fine Adjustment Bracket, TROV ..... MNT-L-FAB* ..... Fine Adjustment Brackets needed = 12" fixtures need 1 and 48" fixtures need 2.

*Fine Adjustment Bracket is highly recommended for Grazing Optics.

Snap-on Lenses

Snap-on Lens, Frosted, 12 inch, L50 ..... LENS-L50-FROST-12
Snap-on Lens, Frosted, 48 inch, L50 ..... LENS-L50-FROST-48
Snap-on Lens, Clear, 12 inch, L50 ..... LENS-L50-CLEAR-12
Snap-on Lens, Clear, 48 inch, L50 ..... LENS-L50-CLEAR-48

Snap-on Lenses need = One 12" lens is needed per 12" fixture and one 48" lens is needed per 48" fixture. Snap on Lenses will not work with the asymmetric fixture. Clear lenses can be used to hold colored filters to customize the output color of any TROV fixture, except the ASYM. Color filters supplied by others.

Wall Mount Arm

Wall Mount Arm, 6 inch, TROV WMA-L-CA-06
Wall Mount Arm, 12 inch, TROV WMA-L-CA-12
Wall Mount Arm, 18 inch, TROV WMA-L-CA-18
Wall Mount Arm, 24 inch, TROV WMA-L-CA-24
Wall Mount Arm End Plate Set, TROV, Includes Left and Right ..... WMA-L-END
Wall Mount Arm Joiner Plate, TROV ..... WMA-L-JNR

Wall Mount Arms needed = For individual fixture installations two arms and one end set Will be needed per fixture. For continuous run installation one endset will be needed per run. Each end set contains one left and one right end plate. One joining set will be needed per joint. One arm per fixture will be need plus one extra arm to complete the run. For example: A 10ft run made with two 4ft and two 1ft fixtures will contain: 1 x WMA-L-END, 3 x WMA-L-JNR, and 5 x WMA-L-CA-12. Leader cables are not included with wall mount arms, end sets, or joiners sets.

Louvers

Louver, Asymmetric, 12 inch, L50 ..... LV-L50-ASYM-12
Louver, Asymmetric, 48 inch, L50 ..... LV-L50-ASYM-48
Louver, Symmetric, 12 inch, L50 ..... LV-L50-SYM-12
Louver, Symmetric, 48 inch, L50 ..... LV-L50-SYM-48
Louver, Honeycomb, 12 inch, L50 ..... LV-L50-HCOMB-12
Louver, Honeycomb, 48 inch, L50 ..... LV-L50-HCOMB-48

Louvers Needed = One 12" louver is needed per 12" fixture and one 48" louver is needed per 48" fixture. 48" louver is made up of four 12" louvers. Louvers cannot be used with the asymmetric fixture.

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CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	Ecosense
	Specification:	L50-E-48" (12" at end of run only)-10-30-80-MLT-9x29-CBL-3P-L-UNV-10-LDCM-PL-120-277-010V-GR-MNT-L-FAB-LENS-L50-CLEAR-48
	Lamp Type:	Integral to fixture
	Approved Alternates:	Color Kinetics, Lumenpulse, Winona

Project Number:	Sandy Springs City Center	Type: **S203B**
15.54.0	Alpharetta, GA	
12-Feb-16		Page: 3 of 3

ECOSENSE

TROV

ORDERING

INTERIOR + EXTERIOR | L50 GRAZE

DATE | PROJECT | FIRM | TYPE

OPTIONAL ACCESSORIES

Masking Plates

Masking Plate, 3 inch high, 12 inch, L50 & L35 ..... MP-L50-3H-12
Masking Plate, 3 inch high, 48 inch, L50 & L35 ..... MP-L50-3H-48

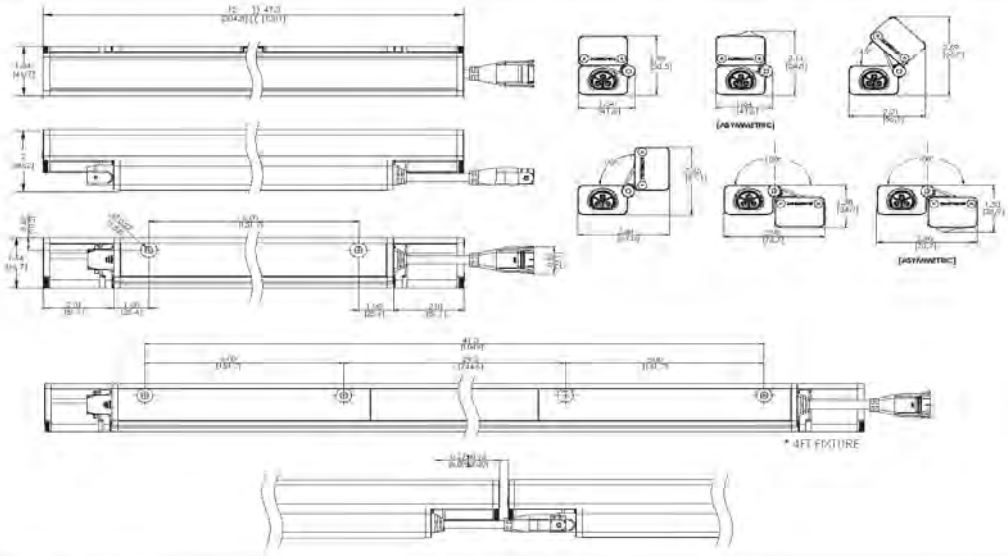
Masking Plates needed = One 12" lens is needed per 12" fixture and one 48" lens is needed per 48" fixture.

Landscape Stake

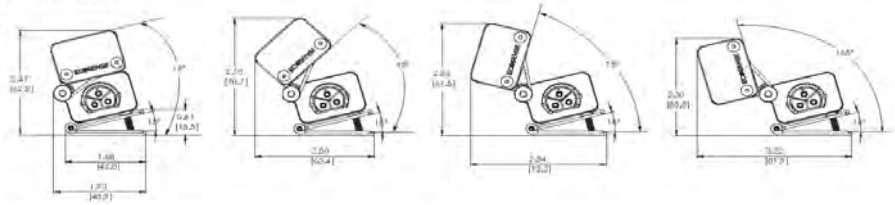
Landscape Stake, 6 inch, TROV, Set of 2 ..... LS-L-STK-06
Landscape Stake, 12 inch, TROV, Set of 2 ..... LS-L-STK-12
Landscape Stake, 18 inch, TROV, Set of 2 ..... LS-L-STK-18

Landscape Stakes needed = 12" and 48" fixtures both need one set of 2

DIMENSIONS + MOUNTING



Fine Adjustable Bracket:



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CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	Ecosense
	Specification:	L50-E-48" (12" at end of run only)-10-30-80-MLT-9x29-CBL-3P-L-UNV-10-LDCM-PL-120-277-010V-GR-MNT-L-FAB-LENS-L50-CLEAR-48
	Lamp Type:	Integral to fixture
	Approved Alternates:	Color Kinetics, Lumenpulse, Winona

Project Number:	Sandy Springs City Center	Type: **S204**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 1 of 1

Compact floodlight

Housing: Luminaire constructed of a one piece die-cast aluminum housing. LED module paired with inner reverse-tapered casting to provide maximum heat transfer to outer housing. Die castings are marine grade, copper free (≤ 0.3% copper content) A360.0 aluminum alloy.

Enclosure: Luminaire's optical system consists of a reflector of pure anodized aluminum and clear safety glass with an integrated stray light control cylinder and a glass optic. The lens and optical assembly is secured by a die cast aluminum trim ring using (3) stainless steel captive fasteners.

Mounting: Provided with a ½" I.P.S. stainless steel nipple for direct attachment to cast boxes or other accessories.

Electrical: 48.2W LED luminaire, 51 total system watts, -20°C start temperature. Integral 120V through 277V electronic LED driver, 0-10V dimming. LED module(s) are available from factory for easy replacement. Standard LED color temperature is 4000K with a >80 CRI. Available in 3000K (>80 CRI); add suffix K3 to order.

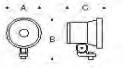
Note: LEDs supplied with luminaire. Due to the dynamic nature of LED technology, LED luminaire data in this catalog is subject to change at the discretion of BEGA-US. For the most current technical data, please refer to www.bega-us.com.

Finish: All BEGA standard finishes are polyester powder coat with minimum 3 mil thickness. These luminaires are available in four standard BEGA colors: Black (BLK); White (WHT); Bronze (BRZ); Silver (SLV). To specify, add appropriate suffix to catalog number. Custom colors supplied on special order.

CSA certified to U.S. and Canadian standards for wet locations. Protection class IP65.

Weight: 6.9 lbs.

Type:
BEGA Product:
Project:
Voltage:
Color:
Options:
Modified:



Compact floodlight · very narrow beam

	Lamp	β	A	B	C			
7651 LED	48.2W LED	10°	9 ⅛	11 ⅝	9	**758**	**721**	**077**

β = Beam angle ◹ 180° glare shield ◻ 360° glare shield ▬ flat beam

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Lighting Design Group
www.cdmlight.com

Manufacturer:	Bega
Specification:	7651LED-BLK-077
Lamp Type:	Integral to fixture
Approved Alternates:	Erco, Targetti, Iguzzini

Project Number:	Sandy Springs City Center	Type: **S205**
15.54.0	Alpharetta, GA	
12-Feb-16		Page: 1 of 1

Wall luminaires with directed light

Housing: One piece die-cast aluminum for direct attachment to wall over 3½" or 4" octagonal wiring box. Die castings are marine grade, copper free (≤ 0.3% copper content) A360.0 aluminum alloy.

Enclosure: One piece die-cast aluminum guard, secured by two (2) captive socket head, stainless steel screws threaded into stainless steel inserts. Tempered etched glass with matte finish. Pure anodized aluminum reflector. Fully gasketed for weather tight operation using a molded silicone rubber O-ring gasket.

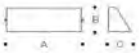
Electrical: 12W LED luminaire, 14.3 total system watts, -20°C start temperature. Integral 120V through 277V electronic LED driver, 0-10V dimming. The LED module and driver are mounted on a removable inner assembly for easy replacement. Standard LED color temperature is 3000K with an 85 CRI. Available in 4000K (85 CRI): add suffix K4 to order.

Finish: All BEGA standard finishes are polyester powder coat with minimum 3 mil thickness. Available in four standard BEGA colors: Black (BLK); White (WHT); Bronze (BRZ); Silver (SLV). To specify, add appropriate suffix to catalog number. Custom colors supplied on special order.

UL listed for US and Canadian Standards, suitable for wet locations. Protection class: IP64

Luminaire Lumens: 465
Tested in accordance with LM-79-08.

Type:
BEGA Product:
Project:
Voltage:
Color:
Options:
Modified:



		Lamp	A	B	C
2380 LED	BLK	12W LED	11 ¾	4⅜	3⅜

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CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	BEGA
	Specification:	2380 LED-BLK
	Lamp Type:	Integral to fixture
	Approved Alternates:	We-ef, OCL, Ligman

Project Number:	Sandy Springs City Center	Type: **S206**
15.54.0	Alpharetta, GA	
12-Feb-16		Page: 1 of 1

Recessed wall luminaire

Housing: Constructed of die cast and extruded aluminum with integral wiring compartment. Mounting tabs provided. Die castings are marine grade, copper free (≤ 0.3% copper content) A360.0 aluminum alloy.

Enclosure: One piece die cast aluminum faceplate, 1/8" thick. Clear tempered glass with translucent white ceramic coating. Faceplate is secured by two (2) socket head, stainless steel, captive screws threaded into stainless steel inserts in the housing casting. Continuous high temperature O-ring gasket for weather tight operation.

Electrical: 3.4W LED luminaire, 4.6 total system watts, -25° C start temperature. Integral 120V through 277V electronic LED driver, 0 -10V dimming. The LED and driver are mounted on a removable plate for easy replacement. Standard LED color temperature is 3000K (available in 4000K; add suffix K4). Through Wiring: Maximum four (4) No. 12 AWG conductors (plus ground) suitable for 75°C. Provided with 1/2" NPT threaded conduit entries.

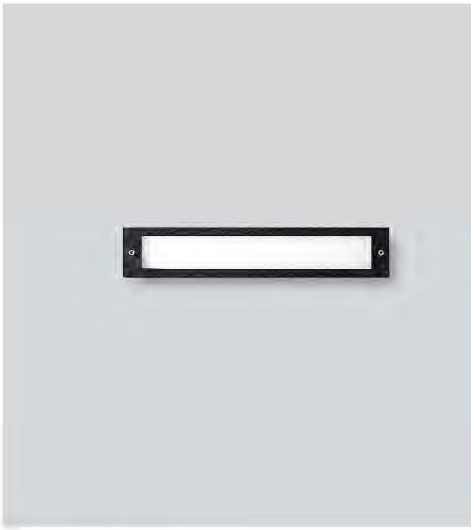
Note: Due to the dynamic nature of LED technology, LED luminaire data on this sheet is subject to change at the discretion of BEGA-US. For the most current technical data, please refer to www.bega-us.com.

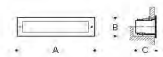
Finish: All BEGA standard finishes are polyester powder coat with minimum 3 mil thickness. These luminaires are available in four standard BEGA colors: Black (BLK); White (WHT); Bronze (BRZ); Silver (SLV). To specify, add appropriate suffix to catalog number. Custom colors supplied on special order.

UL listed for US and Canadian Standards, suitable for wet locations and for installation within 3 feet of ground. Type non-IC. Protection class: IP64.

Luminaire Lumens: 28
Tested in accordance with LM-79-08

Type:
BEGA Product #:
Project:
Voltage:
Color:
Options:
Modified:





	Lamp	A	B	C
2190 LED ANSI	3.4 W LED	6	2½	4¼

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Manufacturer:	BEGA
Specification:	2190 LED-BLK
Lamp Type:	Integral to fixture
Approved Alternates:	WE-EF, Ligman, SPI

CD+M Lighting Design Group
www.cdmlight.com

Project Number:	Sandy Springs City Center	Type: **S207**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 1 of 2

1-year warranty

IP65 LM79 LM80

luxrail™

INTERIOR/EXTERIOR APPLICATIONS

Application

ANSI and ADA compliant, **luxrail** is an indoor/outdoor LED-based handrail that delivers functional illumination. Three intensities may be specified: standard output, mid output, and high output. The standard light output version delivers illuminance levels appropriate for exterior applications (2 footcandles at grade) as well as for dark interior environments with low ambient illumination levels (e.g., themed environments, theatres and residential areas). The high output version delivers illuminance levels applicable to interior environments - providing in excess of 10 footcandles along the path of egress (ANSI required for stair treads). Independent photometric test reports and IES Format data are available at **www.iolighting.com**.

luxrail's standard handrail gripping surfaces are circular in cross section and meet 2004 ADAAG (Americans with Disability Act Accessibility Guidelines). Patented optical assemblies deliver 10°, 25°, and 55° beam spreads, as well as an asymmetric option. The 25° and 55° beam patterns are most suitable for illuminating pathways, while the 10° beam spread offers accent lighting for optional glass or stainless steel cable railing infills. Reference page 54 of this catalog for information regarding infill options. Projected average rated life is 50,000 hours at 70% of lamp lumen output. Contact factory for IES LM-80 compliance. To ensure proper performance, architectural details should allow for ventilation and air flow around the fixture. Ambient temperature surrounding the fixture shall not exceed 122°F (50°C).

Light Output

Three luminous intensities are available for white light. All values below represent the initial raw lumens of the LED. IES format photometry of Lighting Facts labels represent actual light output measured in lumens and candle power. Light output losses include optical, thermal and power supply inefficiencies. IES LM-79 format files may be obtained from the factory or downloaded from **www.iolighting.com.** Results are typical measurements. For 90+ CRI, please consult factory for pricing and availability.

Initial Lumens

	Standard Output	Mid Output	High Output
2700K White:	72 lms/ft	181 lms/ft	253 lms/ft
3000K White:	81 lms/ft	203 lms/ft	284 lms/ft
3500K White:	83 lms/ft	206 lms/ft	289 lms/ft

Non-standard color temperatures available as a custom offering for a modest additional cost and lead-time.

Construction

luxrail may be post mounted or wall mounted. **io** recommends installation be completed by a qualified handrail installer. Mounting hardware (post or wall) is typically required up to 5' O.C., depending on the handrail alloy. Final post and wall bracket spacing must be determined by a licensed architect or structural engineer. **luxrail** is available in stainless steel and aluminum. Vandal resistant access chamber allows units to be removed for maintenance purposes. The LED light fixture inside the caprail is UL Listed for wet locations. Handrail alloy options include stainless steel and aluminum. Contact factory for maintenance guidelines.

All handrail component parts are engineered for quick installation. Field welding or cutting is typically not required. All parts are prefubricated to field dimensions and are assembled in the field with mechanical connection or epoxy. Contact **io** Lighting for recommended handrail installers.

Electrical

luxrail houses a low voltage LED-based light fixture that is integrated into the underside of the handrail. 24 volt 100 watt power supplies are provided as a standard. For detailed information regarding daisy chain limitations, remote distance limitations, power supply options, and dimming options consult the **io** website **(www.iolighting.com)** or an **io** representative.

Driver Remote Distance
7'-0" (2.1m) w/22 AWG
18'-0" (5.5m) w/18 AWG
46'-0" (14.0m) w/14 AWG
71'-0" (21.6m) w/12 AWG

Dimming modules must be specified separately. For detailed information download the power supply specification sheet from **www.iolighting.com**.

Power Consumption

Power consumption does not include power supply losses.

Standard Output	Mid Output	High Output
1.02 w/ft	2.54 w/ft	3.81 w/ft

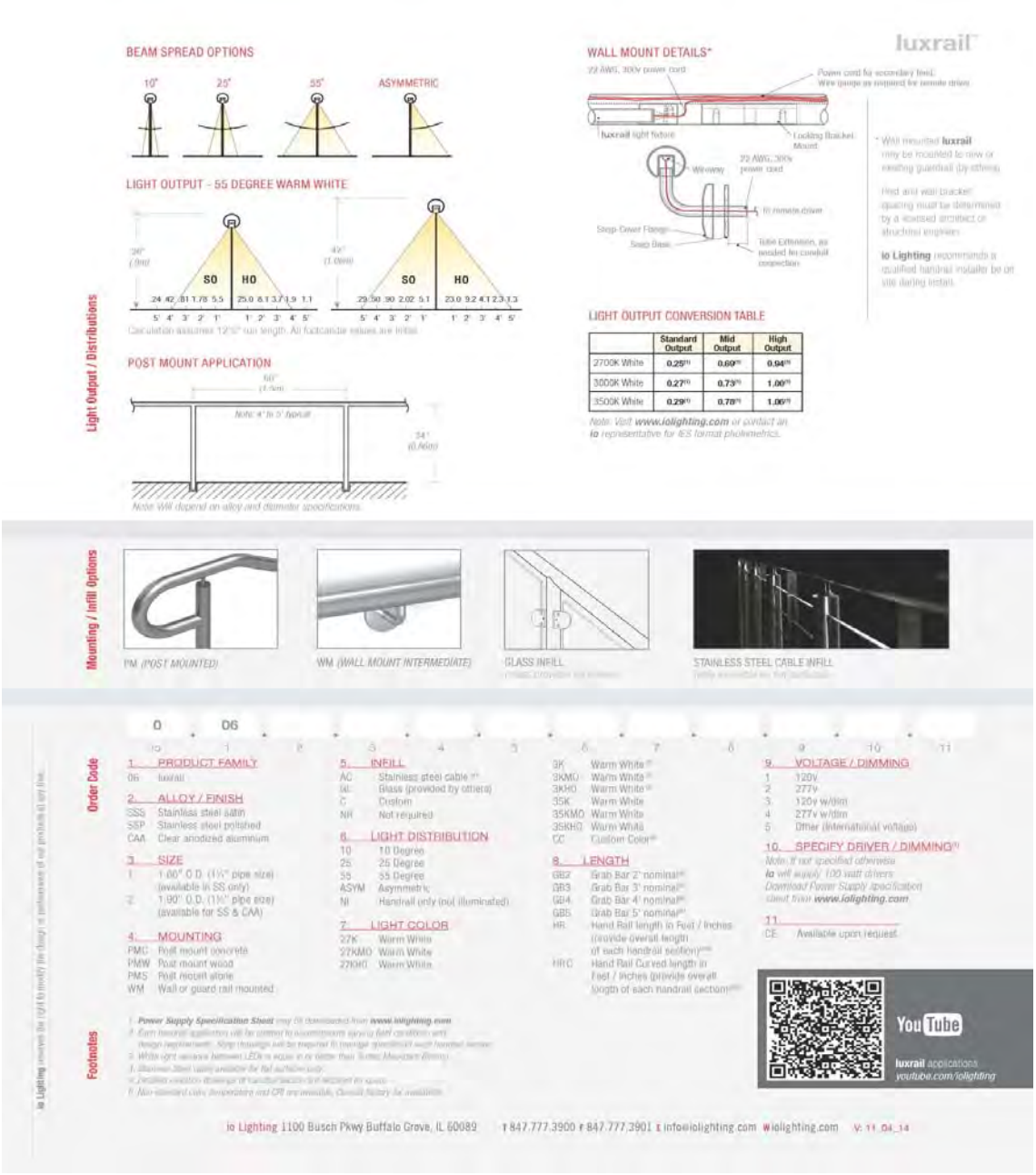
Dimensions

Label references 36" luxrail fixture with a 55° beam spread in High Output 3000K. Lighting Facts for additional beam spreads and light output levels may be obtained from io Lighting.

io Lighting 1100 Busch Pkwy Buffalo Grove, IL 60089 t 847.777.3900 f 847.777.3901 e info@iolighting.com w iolighting.com V 11_04_14

CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	IO Lighting "Luxrail"
	Specification:	O-06-CCA-2-WM-NR-ASYM-3KMO-LENGTH AS REQ'D-VOLT
	Lamp Type:	Integral to fixture
	Approved Alternates:	Eti-S3, Intense Lighting, Wagner

Project Number: 15.54.0 12-Feb-16	Sandy Springs City Center Alpharetta, GA	Type: **S207** Page: 2 of 2



CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	IO Lighting "Luxrail"
	Specification:	O-06-CCA-2-WM-NR-ASYM-3KMO-LENGTH AS REQ'D-VOLT
	Lamp Type:	Integral to fixture
	Approved Alternates:	Eti-S3, Intense Lighting, Wagner

Project Number:	Sandy Springs City Center	Type: **S208**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 1 of 1

Drive-over in-ground floodlights · STAINLESS STEEL
for installation in pre-cored holes

Enclosure: Heavy gauge stainless steel. Provided with two external clamps that secure the luminaire in a pre-cored hole prepared by the customer.

Trim Ring: Heavy gauge, machined stainless steel secured to the inner housing with captive, stainless steel fasteners. Trim is sealed in place using molded, one piece high temperature silicone gasket. Glass is tempered, ½" thick machined flush to trim ring.

Electrical: 13W LED luminaire, 15.5 total system watts, -30°C start temperature. Integral 120V through 277V electronic LED driver, 0-10V dimming. LED module(s) are available from factory for easy replacement. Standard LED color temperature is 4000K with a >80 CRI. Available in 3000K (>80 CRI); add suffix K3 to order. Inner housing pre-wired with nine (9) feet of 18/3 water stopper cabl, cable clamp, and waterproof cable gland entry into housing. A separate weatherproof wiring box for power supply must be provided (by contractor).

Adjustable Optical Assembly: Consists of pressed glass, faceted anodized aluminum reflector. Spread lenses may be added as available options. Precise aiming is achieved by adjusting reflector assembly 180° horizontal and up to 30° vertical in 5° increments and locking in place with integral set screw.

Note: LEDs supplied with luminaire. Due to the dynamic nature of LED technology, LED luminaire data on this sheet is subject to change at the discretion of BEGA-US. For the most current technical data, please refer to www.bega-us.com.

Finish: Machined #4 brushed stainless steel. Custom colors are not available.

Temperature Caution: The column 'T' in this chart indicates the temperature in degrees Celsius which is reached on the center of the glass surface during operation. Surface temperatures are for exterior applications, for interior applications add 10° C to temperatures shown.

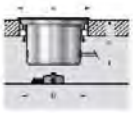
Note: These luminaires are designed to bear pressure loads up to 4400lbs. from vehicles with pneumatic tires. The luminaires must not be used for traffic lanes where they are subject to horizontal pressure from vehicles braking, accelerating and changing direction.

CSA certified to U.S. and Canadian standards, suitable for wet locations. Protection class IP68 10m

Weight: 7.1 lbs.

Luminaire Lumens: 588
Tested in accordance with LM-79-08

Type:
BEGA Product:
Project:
Voltage:
Color:
Options:
Modified:



Adjustable floodlights · **clear** safety glass

	Lamp	β	T	A	B	C		
7099 LED	13 W LED	9°	35°	8	7 1/8	8 1/2	**262**	**263**

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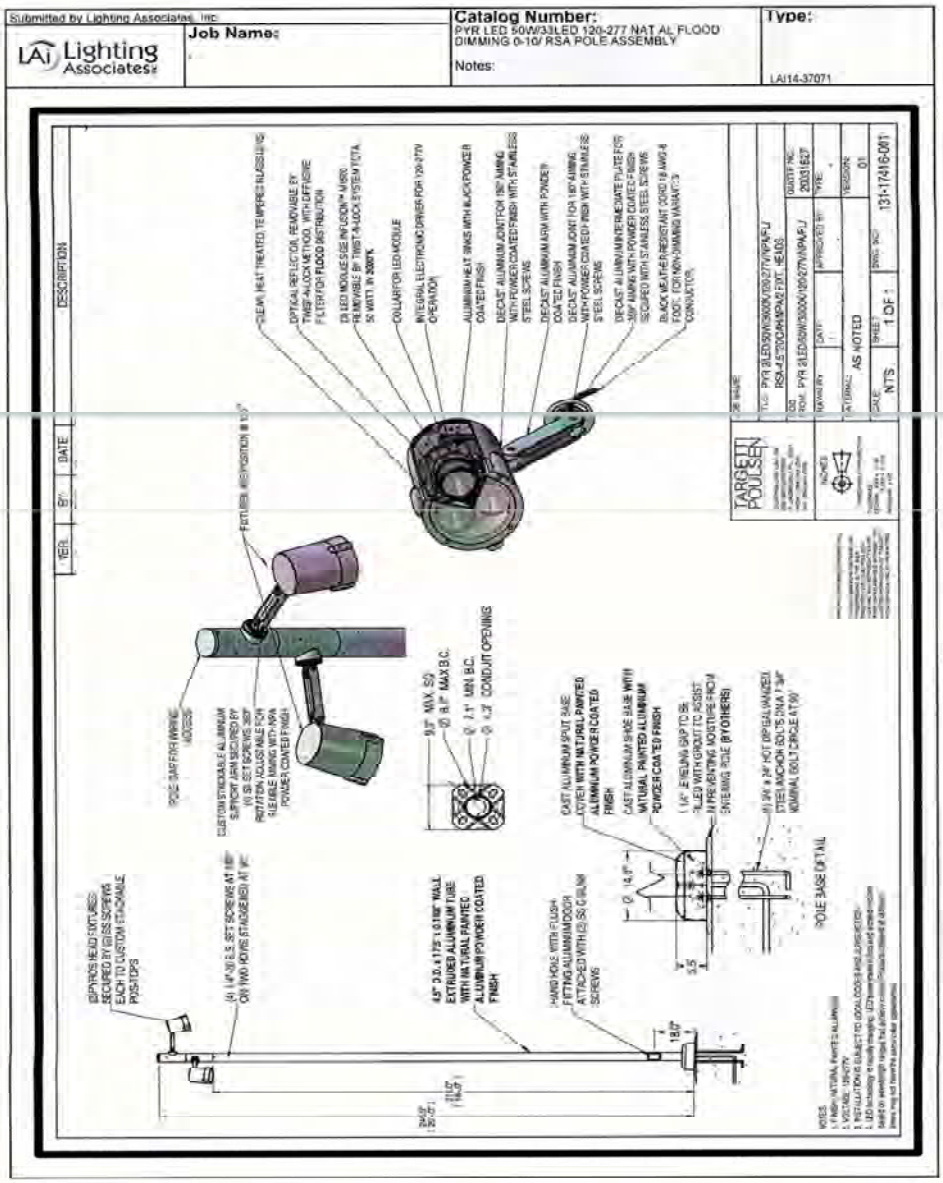
CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	Bega
	Specification:	7099
	Lamp Type:	Integral to fixture
	Approved Alternates:	Hydrel, We-Ef, Kreon

Project Number:	Sandy Springs City Center	Type: **S209A**
15.54.0	Alpharetta, GA	
12-Feb-16		Page: 1 of 1



CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	Targetti Poulsen
	Specification:	POLE: RSA-4.5"/21O.A.H./3 FIXT. HEAD
	Lamp Type:	Integral to fixture
	Approved Alternates:	Bega, Iguzzini, Ligman

Project Number:	Sandy Springs City Center	Type: **S209B**
15.54.0	Alpharetta, GA	
12-Feb-16		Page: 1 of 1

TARGETTI

TYPE
PROJECT

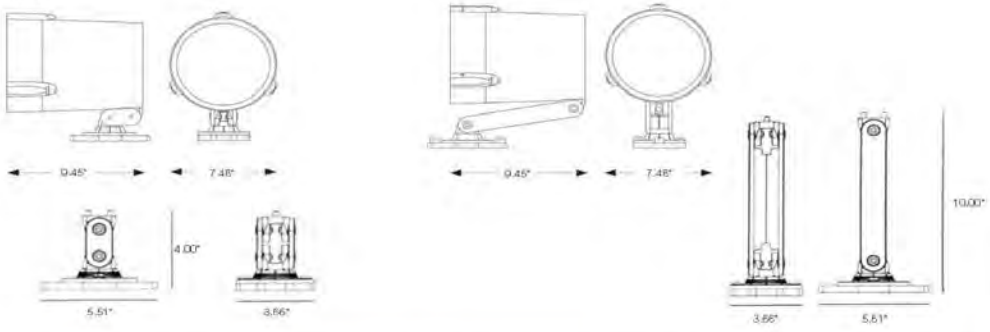
PYROS PROFESSIONAL FLOOD LIGHT FOR HIGH INTESITY LED

Concept: Professional LED flood light.
Housing: Die-cast aluminum body and joints, 140° vertical adjustment with aim locking and +/- 45 horizontal adjustability.
Materials: Die cast aluminum body, brackets and joints. Extraclear tempered safety glass, 20 joule shock resistant.
Optic: Faceted precision optic in super pure aluminum with high luminous efficiency.
Mounting: All flood light bodies must be completed with dedicated mounting bracket equipped with graduated metal ring on the bracket to adjust the fitting 360° on the horizontal axis and 180° on the vertical axis. Mechanical locking system to ensure aiming stability.
Driver: Integrated electronic power supply. Pre-cabled with H07RN-F (2x1,5mm²) resinated for water tight.
Wattage: 25W 38W
Color Temperature: 3000K (up to 3211Lm) / 4000K (up to 3307Lm)
CRI: 84
Voltage: 120V AC 50/60Hz
IP: IP67 rated
Certifications: UL

PRODUCT CODE	TYPE	OUTPUT	OPTICS	COLOR TEMPERATURE	DRIVER
	LN – Long Neck	25 – 25W	FL – Flood	30 – 3000K	SD – ELECTRONIC
PY - Pyros	SN – Short Neck	38 – 38W	SP – Spot	40 – 4000K	10 – 1-10V

ACCESSORIES:	
1E0995	Ground Stake, 4.3" length

Views



CD+M Lighting Design Group
www.cdmlight.com

Manufacturer:	
Specification:	HEAD: PY-LN-38W-FL-30K-10-
Lamp Type:	
Approved Alternates:	

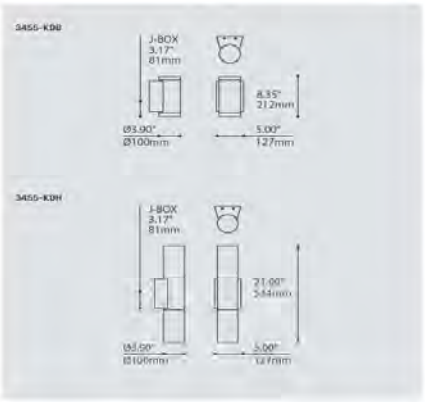
Project Number:	Sandy Springs City Center	Type: **S210**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 1 of 2

SILENE OUT DOUBLE 3455

PROJECT PROJET

SPEC TYPE

NOTES



ORDERING SPECIFICATION SPÉCIFICATION DE COMMANDE — **CODE**

MODEL MODÈLE

3455-KDB SILENE OUT DOUBLE KDB
3455-KDH SILENE OUT DOUBLE KDH

LIGHT SOURCE SOURCE LUMINEUSE

2XLED.4.30 4W X 2, LED 3000K (WARM)
2XLED.4.40 4W X 2, LED 4000K (NEUTRAL)
2XLED.8.30 8W X 2, LED 3000K (WARM)
2XLED.8.40 8W X 2, LED 4000K (NEUTRAL)

VOLTAGE VOLTAGE

120V 120 VOLT
277V* 277 VOLT

STRUCTURE FINISH FINI STRUCTURE — **ANTE**

ANTE ANTHRACITE FINE TEXTURE

DIFFUSER FINISH FINI DIFFUSEUR — **CFR**

CFR CLEAR FROSTED

PRODUCT CHARACTERISTICS CARACTÉRISTIQUES DU PRODUIT

ADA LED

DESIGN: Designed for use in outdoor corridors and public areas. This wall mounted provide up and down lighting effects.
LIGHT SOURCE: 2 x 4W and 2 x 8W LED available in 3000K (Warm white) or 4000K (Neutral white).
STRUCTURE: Die-cast aluminum, die-stamped galvanized steel and die-cut silicone gasket.
DIFFUSER: Cryptal glass shade (KDB and KDH).
CERTIFIED: c-CSA-us Wet Locations designed for IP64 - Suitable for interior and exterior projects

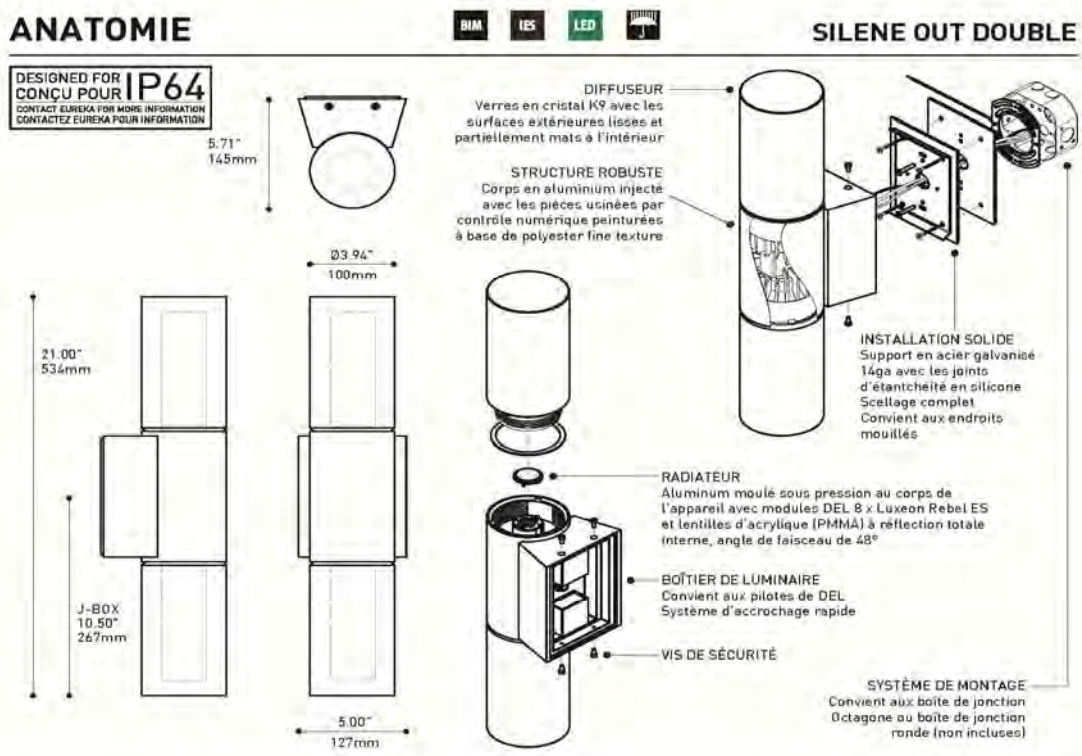
CONCEPTION: Conçue pour être utilisée dans les couloirs extérieurs et espaces publics. Cette applique murale permet de produire un éclairage vers / hors haut.
SOURCE LUMINEUSE: 2 x 4W et 2 x 8W DEL disponible en 3000K (Blanc chaud) ou 4000K (Blanc neutre).
STRUCTURE: Aluminium injecté, acier galvanisé découpé et joint d'étanchéité en silicone comprimé pour résister aux intempéries.
DIFFUSEUR: Verre en cristal (KDB et KDH).
CERTIFIÉ: c-CSA-us Emplacement Mouillé conçu pour IP64 - Convient aux projets intérieurs et extérieurs

EUREKA **SPECIFICATION**

Eureka Lighting ©2014 www.eurekalighting.com V1.0-201401

CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	Eureka "Silent Out Double"
	Specification:	345555-KDH-2xLED8.30-VOLT-ANTE-CFR
	Lamp Type:	Integral to fixture
	Approved Alternates:	WAC Lighting, Beta Calco, Visa Lighting

Project Number:	Sandy Springs City Center	Type: **S210**
15.54.0	Alpharetta, GA	
12-Feb-16		Page: 2 of 2



CARACTÉRISTIQUES	3455-KDH	
SOURCE LUMINEUSE	8 x Luxeon Rebel ES - au total ± 8w or 2 x 4w	8 x Luxeon Rebel ES - au total ± 16w or 2 x 8w
MODULE	Reconnu par UL - Fabriqué aux États-Unis	
LUMENS RÉELS	649 lms (3000K) - 689 lms (4000K)	1110 lms (3000K) - 1210 lms (4000K)
IRC	ANSI trié à 3000K (80 CRI) & 4000K (80 CRI)	
ROHS	Conforme	
RADIATEUR	Aluminium moulé sous pression, peinturé noir	
DISTRIBUTION LUMINEUSE	Directe & Indirecte - LEDIL TIR 48° angle total	
VOLTAGE	120V ou 277V	120V seulement
PILOTES	2 x 350mA - 6W Alimentation à tension constante	2 x 700mA - 9W Alimentation à tension constante
GRADATION	N/A	
LM-79 / L70	En cours / 50 000 hrs estimés	
STRUCTURE	Aluminium injecté et machiné / Acier galvanisé découpé et plié / Joints d'étanchéité en silicone	
DIFFUSEUR	Verre machiné clair aux surfaces lisses et brillantes mesuré de 7" en hauteur pour l'option KDH	
FINITION	Peinture à base de polyester grise anthracite fine texture	
ADA	Conforme	
GARANTIE	5 ans	

CD+M Lighting Design Group
www.cdmlight.com

Manufacturer:	Eureka "Silent Out Double"
Specification:	345555-KDH-2xLED8.30-VOLT-ANTE-CFR
Lamp Type:	Integral to fixture
Approved Alternates:	WAC Lighting, Beta Calco, Visa Lighting

Project Number:	Sandy Springs City Center	Type: **S211**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 1 of 1

Recessed wall luminaires with directed light

Housing: Constructed of die-cast and aluminum with integral wiring compartment. Mounting tabs provided. Die castings are marine grade, copper free (≤ 0.3% copper content) A360.0 aluminum alloy.

Enclosure: One piece die-cast aluminum faceplate. Clear tempered glass; .125" thick, machined flush to faceplate surface. Faceplate is secured by two (2) flush, socket head, stainless steel captive screws threaded into stainless steel inserts in the housing casting. Continuous high temperature, molded silicone rubber gasket for weather tight operation.

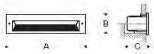
Electrical: 11.2 W LED luminaire, 14.5 total system watts, -30°C start temperature. Integral 120 V-277 V electronic LED driver, 0 -10 V dimming. The LED and driver are mounted on a removable plate for easy replacement. Standard LED color temperature is 3000K (available in 4000K; add suffix K4).
Note: Due to the dynamic nature of LED technology, LED luminaire data on this sheet is subject to change at the discretion of BEGA-US. For the most current technical data, please refer to www.bega-us.com.

Finish: All BEGA standard finishes are polyester powder coat with minimum 3 mil thickness. Available in four standard BEGA colors: Black (BLK); White (WHT); Bronze (BRZ); Silver (SLV). To specify, add appropriate suffix to catalog number. Custom colors supplied on special order.

UL listed for US and Canadian Standards, suitable for wet locations and for installation within 3 feet of ground. IC rated. Protection class: IP65.

Luminaire Lumens: 342
Tested in accordance with LM-79-08

Type:
BEGA Product:
Project:
Voltage:
Color:
Options:
Modified:



		Lamp	A	B	C
2384 LED	ADA	11.2W LED	12½	2¾	2½

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Manufacturer:	Bega
Specification:	2384LED
Lamp Type:	Integral to fixture
Approved Alternates:	WE-EF, Erco, Design Plan

CD+M Lighting Design Group
www.cdmlight.com

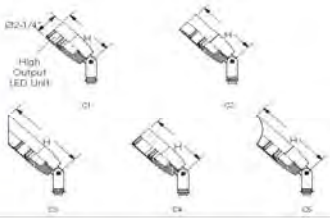
Project Number:	Sandy Springs City Center	Type: **S212**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 1 of 4

ASPEN LED
WINSCAPE® 12V LED16

CATALOG NUMBER	
NOTES	
TYPE	

Specifications

D:	* Mounting
H:	4-3/4" (121mm) w/C1 5-3/4" (146mm) w/C2 7-5/8" (194mm) w/C3 5-1/2" (140mm) w/C4 7-5/8" (194mm) w/C5



DESCRIPTION

The Aspen series accent lights are suitable for a variety of mounting applications including ground, wall, tree, sign and architectural accents. Suitable for wet locations.

ORDERING INFORMATION

EXAMPLE: ASPEN SS 3LED16 30K 12 NSP WSL KM BRS

ASPEN		3LED16					
Series*	Material*	Source*	Color Temperature*	Voltage*	Distribution*	Lens*	Mounting*
ASPEN	A Aluminum BR Brass SS Stainless Steel	3LED16	30K 40K 50K AMB Amber (591nm)	12[1] 120[1]	NSP 10° Narrow Spot NFL 25° Narrow Flood FL 40° Flood	FLC Flat Clear WSL Watershed	KM Knuckle 350R 350° rotational knuckle

Mounting Accessories*				Options[6]		External Caps*	Finish*		Brass Only[8]	
Independent Mounting		**Power Boxes with 15W Electronic transformers**		**Internal Louver**		C1 Short Flush	**All Material**		BRZ	Satin Bronze w/ Satin Clear
JBA	Aluminum J-Box	PM60B[2]	Power Mount	IHL	Honeycomb Louver	C2 Recessed Lens	BL	Black Textured	NAT	Natural Brass w/ Satin Clear
JBB	Bronze J-Box Architectural	PMBR60B[2]	Brass Power Mount	**Internal Accessory**		C3 45° Angle Cut	BRS	Bronze Smooth	POL	Polished Brass w/ Gloss Clear
ARJB	J-Box, Aluminum 12"-48"	WP2J[2]	Wall Pack over recessed JBox	L1	Prismatic Lens	C4 Long Flush	BRT	Bronze Textured	**Stainless Only[8]**	
CN5	5" round canopy	WP2S[2]	Surface Mount Wall Pack	L2	Linear Spread Lens	C5 45° Scallop Cut	CHS	Chrome Smooth	BRSS	Brushed Stainless Steel
CN5BR	5" round canopy, brass	**Stems**		L3	Softening Lens		DBL	Black Smooth	NSS	Natural Stainless Steel
CN5SS	5" round canopy, stainless	S3[3]	3" Stem	**Internal Filters**			DDB	Designer Bronze	PSS	Polished Stainless Steel
WMC	Wall Mount Cover	S6[3]	6" Stem	FA	Amber		DNA	Natural Aluminum		
WMSA	Wall Mount with Splice Access	S__[3]	12" - 24" stems, available in 6" increments	FG	Green		NBS[7]	Natural Bronze Smooth		
STK	Mounting Stake	S3BR[4]	3" Stem Brass	FGD	Green Dichroic		VET	Verde Textured		
TRA	Tree Mounted J-Box, Aluminum	S6BR[4]	6" Stem Brass	FLB	Light Blue		WH	White Textured		
TRB	Tree Mounted J-Box, Bronze	S__BR[4]	12" - 24" stems, available in 6" increments	FM	Mercury Vapor		WHS	White Smooth		
_TRAS	Tree Mounted J-Box with Aluminum mounting strap, available with 1-4 JBoxes per strap	**Extended Arms[5]**		FMB	Medium Blue		CF	Custom Finish		
_TRBS	Tree Mounted J-Box with Bronze mounting strap, available with 1-4 JBoxes per strap	EA__	12", 24" or 36"	FMBD	Medium Blue Dichroic					
PM60A	Adjustable Post Mount	EA45__	45° - 12", 24" or 36"							
PMBR60A	Adjustable Post Mount - Bronze	EA90__	90° - 12", 24" or 36"							
PM60C	Post Mount with Conduit									
PMBR60C	Post Mount with Conduit - Bronze									
PM60D	Post Mount with Open Bottom									
PMBR60D	Post Mount with Open Bottom - Bronze									

*Required Fields

Notes:
1. Remote transformer required.
2. 120 volt only available with power boxes, fixture itself is 12 volt.
3. Aluminum stems only compatible with A material, not compatible with JBB, TRB, _TRBS, PMBR60A, PMBR60B, PMBR60C, PMBR60D, CN5BR or CN5SS.
4. Brass stems only compatible with BR material and JBB, TRB, _TRBS, PMBR60A, PMBR60B, PMBR60C or PMBR60D.
5. Extended arms only available with WMSA.
6. Up to 3 optional items can be specified.
7. NBS paint uses specialty pigments to give a natual appearance that may vary by fixture.
8. Brass only and Stainless only finishes not available with mounting accessories.

NOTE: Hydrel Reserves The Right To Modify Specification Without Notice. Any dimension on this sheet is to be assumed as a reference dimension. "Used for information purposes only. It does not govern manufacturing or inspection requirements." (ANSI Y14.5-1973)

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Rev. 12/15/15
ASPEN_LED

CD+M Lighting Design Group
www.cdmlight.com

Manufacturer:	Winona "Aspen"
Specification:	ASPEN-A-3LED16-30K-120-NFL-FLC-KM-PM60B-L3-C3-FINISH T.B.D./PM60B-ET15-120-S3-FINISH T.B.D
Lamp Type:	Integral to fixture
Approved Alternates:	Vista Pro, Lumascape, BK lLighting

Project Number:	Sandy Springs City Center	Type: **S212**
15.54.0	Alpharetta, GA	
12-Feb-16		Page: 2 of 2

PERFORMANCE DATA

LUMEN OUTPUT

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown, within the tolerances allowed by Lighting Facts. Actual performance may differ as a result of end-user environment and application. Contact factory for performance data on any configurations not shown here.

Light Engines	Dist. Type	Beam Angle	Field Angle	30K Centerbeam Candlepower	Power (Wattage)	Efficacy (LPW)	Delivered Lumens	CRI (Ra)
3LED16	Narrow Spot	10°	28°	2400	5.8	38	220	>83
	Narrow Flood	25°	42°	1000	5.8	37	215	>83
	Flood	40°	70°	750	5.8	36	210	>83

Light Engines	Dist. Type	Beam Angle	Field Angle	50K Centerbeam Candlepower	Power (Wattage)	Efficacy (LPW)	Delivered Lumens	CRI (Ra)
3LED16	Narrow Spot	10°	28°	4200	5.8	55	320	>68
	Narrow Flood	25°	42°	1500	5.8	51	290	>68
	Flood	40°	70°	890	5.8	44	260	>68

Projected LED Lumen Maintenance

Data references the extrapolated performance projections for the **Fixture** platform in a **25°C ambient**, based on 10,000 hours of LED testing (tested per IESNA LM-80-08 and projected per IESNA TM-21-11).

To calculate LLF, use the lumen maintenance factor that corresponds to the desired number of operating hours below. For other lumen maintenance values, contact factory.

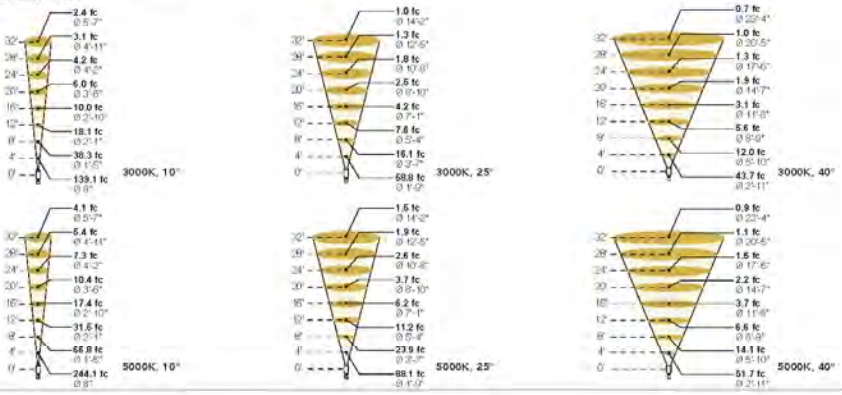
Operating Hours	0	20,000	40,000	60,000
Lumen Maintenance Factor	1.0	0.92	0.85	0.71

LED LIFE: L70/60,000 hours
OPERATING TEMPERATURE: 30°C Through 40°C

PHOTOMETRIC DIAGRAMS

To see complete photometric reports or download .ies files for this product, visit:

Isocandela plots for ASPEN LED



FEATURES & SPECIFICATIONS

MATERIAL: Body, caps and knuckle machined from 6061-T6 aluminum.

LIGHT SOURCE: Winscape proprietary replaceable LED unit using three (3) high output LEDs and an integral low voltage (11V-14V) AC/DC LED driver and a field replaceable optic. Units have near constant light output when supplied with 11VAC - 14VAC to combat voltage drop. Dimmable using standard ELV VOLTAGE MAGNETIC dimming switch/systems.

VOLTAGE: 12 Volt AC

DISTRIBUTION: Available in three (3) beam spreads: 10° Narrow Spot, 25° Narrow Flood, and 40° Flood.

LENS: Cut from heat strengthened borosilicate glass for superior clarity and strength.

MOUNTING: Adjustable knuckle is 1/2" NPT.

POWER SUPPLY: Remote 12Vac transformer, purchased separately.

FINISH: Super durable polyester TGIC powder coat finish (standard). Optional zinc undercoat for harsh environments.

FEATURES: Field replaceable lens. Tapered "Sure Lock" knuckle seat for infinite aiming and an unparalleled locking ability. Any combination of up to 2 lens accessories/color filter/shielding can be specified in any cap style and are held securely by a removable stainless steel clip ring.

LISTING: ETL.

WARRANTY: 5 year limited warranty. Complete warranty terms located at

Consult factory for details.

NOTE: Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25 °C. Specifications subject to change without notice.

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Rev. 12/15/15
ASPEN_LED

CD+M Lighting Design Group
www.cdmlight.com

Manufacturer:	Winona "Aspen"
Specification:	ASPEN-A-3LED16-30K-120-NFL-FLC-KM-PM60B-L3-C3-FINISH T.B.D./PM60B-ET15-120-S3-FINISH T.B.D
Lamp Type:	Integral to fixture
Approved Alternates:	Vista Pro, Lumascape, BK lLighting

Project Number:	Sandy Springs City Center	Type: **S212**
15.54.0	Alpharetta, GA	
12-Feb-16		Page: 3 of 4

POWER MOUNT™ 60

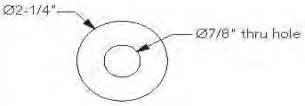
CATALOG NUMBER	
NOTES	
TYPE	

DESCRIPTION

The Power Mount™ 60 is a ground-mounted post that includes a 120 to 12 volt integral transformer for low-voltage fixtures. Optimal stems are offered in lengths from 3" to 36". Suitable for fixtures with 1/2" knuckles, fixtures are secured with a locking nut.

Specifications

D	3-1/4"
H	XX" (XXmm)
Weight	lbs (kg)

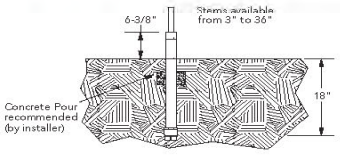


ORDERING INFORMATION

EXAMPLE: PMBR60B 120 WH

Series	Transformer	Voltage	Stem Length		Finish	
PM60B Power Mount 60 Aluminum	ET15[1] 15W transformer	120 120 Volt	**Aluminum[3]**	**Brass[4]**	**All Material**	**Brass Only**
PMBR60B Power Mount 60 Brass	ET60[2] 60W transformer		S3 3" Stem	S3BR 3" Stem	BL Black Textured	POL Polished Brass W/ Gloss Clear
			S6 6" Stem	S6BR 6" Stem	BRS Bronze Smooth	NAT Natural Brass W/ Satin Clear
			S12 12" Stem	S12BR 12" Stem	BRT Bronze Textured	BRZ Satin Bronze W/ Satin Clear
			S18 18" Stem	S24BR 24" Stem	WH White	
			S24 24" Stem	S30BR 30" Stem	DNA Natural Aluminum	
			S30 30" Stem	S36BR 36" Stem	CHS Chrome Smooth	
			S36 36" Stem		NBS Natural Bronze Smooth	
					VET Verde Textured	
					CF Custom Finish	

MOUNTING



Notes:
1. ET15 for use with LED and halogen sources.
2. ET60 for use with halogen sources only.
3. Aluminum stems compatible with PM60B.
4. Brass stems compatible with PMBR60B.

NOTE: Hydrel Reserves The Right To Modify Specification Without Notice. Any dimension on this sheet is to be assumed as a reference dimension. "Used for information purposes only. It does not govern manufacturing or inspection requirements." (ANSI Y14.5-1973)

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Rev. 01/28/15
PM60B

Manufacturer:	Winona "Aspen"
Specification:	ASPEN-A-3LED16-30K-120-NFL-FLC-KM-PM60B-L3-C3-FINISH T.B.D./PM60B-ET15-120-S3-FINISH T.B.D
Lamp Type:	Integral to fixture
Approved Alternates:	Vista Pro, Lumascape, BK lLighting

CD+M Lighting Design Group
www.cdmlight.com

Project Number:	Sandy Springs City Center	Type: **S212**
15.54.0	Alpharetta, GA	
12-Feb-16		Page: 4 of 4

FEATURES & SPECIFICATIONS

CONSTRUCTION
aluminum: cap and power mount housing machined from aluminum. Stake below grade cut from UL approved PVC. All hardware is stainless steel.

Brass: cap and power mount housing machined from brass. Stake below grade cut from UL approved PVC. All hardware is stainless steel.

STEMS
All stems are Ø1" and threaded 1/2" NPS. Style "B" not for use with LED fixtures.

TRANSFORMER TYPE
Available with either a 15W or 60W transformer and two 1/2" conduit adapters in endcap (120V only).

FINISHES
Aluminum: Available in standard TGIC polyester powder coat finishes. Custom powder coat finishes available (contact factory for more information).

Brass: Available in 3 standard brass finishes as well as the standard TGIC powder coats. Custom finishes available (contact factory for more information).

LISTING: UL Listed: Wet Location: Outdoor.

WARRANTY: 1-year limited warranty. Complete warranty terms located at www.acuitybrands.com/CustomerResources/Terms_Conditions.aspx

Consult factory for details.

Specifications subject to change without notice.

Actual performance may differ as a result of end user environment and application.

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Rev. 01/28/15
PM60B

CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	Winona "Aspen"
	Specification:	ASPEN-A-3LED16-30K-120-NFL-FLC-KM-PM60B-L3-C3-FINISH T.B.D./PM60B-ET15-120-S3-FINISH T.B.D
	Lamp Type:	Integral to fixture
	Approved Alternates:	Vista Pro, Lumascape, BK lLighting

Project Number: 15.54.0 12-Feb-16	Sandy Springs City Center Alpharetta, GA	Type: **S213** Page: 1 of 2

BeveLED 2.1

PROJECT INFORMATION

PROJECT_____

DATE _____

TYPE _____

DOWNLIGHT 3021

1" Regress | 2-1/2" Regress

BeveLED 2.1 Recessed Downlight - BeveLED 2.1 is the most complete recessed LED downlight product family available from USAI Lighting, now with more BeveLED trim finishes, LED classic white color temperatures, innovative housing styles, and dimming driver options than before. With industry-leading performance, BeveLED 2.1 can provide a solution for any project - commercial, corporate and residential installations.

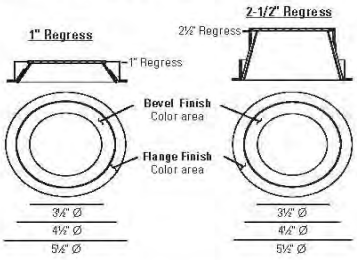
DELIVERED PERFORMANCE

BeveLED 2.1 DOWNLIGHT	9 Watts		12 Watts		16 Watts		24 Watts		33 Watts	
	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI
Color Rendering Index										
Lumens per Watt	93	68	86	67	86	67	80	63	71	57
Source Lumens	1150	900	1300	1025	1725	1350	2400	1875	3025	2350
Delivered Lumens	**775**	**600**	**1025**	**800**	**1375**	**1075**	**1925**	**1500**	**2400**	**1875**
Color Consistency	2-Step MacAdam Ellipse									

Performance based on 3000K

CCT MULTIPLIER	2200K	2700K		3000K		3500K	4000K
	80+ CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	80+ CRI
Color Rendering Index							
Multiplier for Lumen Output	0.72	0.94	0.78	1.00	.78	1.00	1.06

90+ CRI is not available for 2200K, 3500K, or 4000K.



HOW TO SPECIFY

Ordering Example: Specify trim code and housing code to order: Example : **3021W - B1- S - 10 - LRTD4 - 9012 - C3 - 27KS - 50 - NC - 277V - DIML2 - CB27**

TRIM ORDERING INFORMATION

TRIM	OPTION		BEVEL STYLE		LENS	FLANGE FINISH	
3021	_____	-		-		-	
3021 Round Downlight 1" or 2-1/2" Regress	**W**	Wet location [1]	**B1**	1" Regress Bevel, Painted Die Cast Matches Flange Finish	**S** Solite (provided standard)	**01** Clear Matte (AC Bevel only)
	EML	Integral Emergency Test Switch [2]	**AB1**	1" Regress Bevel, Black Anodized	**F** Frosted	**02** Black Anodized (AB Bevel only)
	TZ	6" TechZone ceiling compatible (NCSM only)	**AC1**	1" Regress Bevel, Clear Matte Anodized		**10** White
			B2	2-1/2" Regress Bevel, Painted Die Cast Matches Flange Finish		**13** Statuary Bronze
			AB2	2-1/2" Regress Bevel, Black Anodized [3]		**21** Black
			AC2	2-1/2" Regress Bevel, Clear Matte Anodized [3]		**28** Metalized Grey
						RAL Custom Color (specify RAL #)

[1] Wet location, use with B1 trims only.
[2] See table on page 2
[3] Not for use with FT or NCSM housing.

HOUSING ORDERING INFORMATION

HOUSING CODE	WATTAGE	ENGINE CODE	COLOR	REFLECTOR	HOUSING TYPE	SELECT ONE VOLTAGE	DIMMING DRIVER OPTIONS	ACCESSORIES
LRTD4	-	- C3 -	-	-	-	-	-	-

LRTD4	C3			
9009 9W LED,	**22KS** 2200K, 80+ CRI	**25** 25° beam	**FT** Flat Housing New Construction	**CB27** 27" C-Channel Bars
9012 12W LED,	**27KS** 2700K, 80+ CRI	**50** 50° beam	**NCSM** New Construction Narrow Width	**CB52** 52" C-Channel Bars
9016 16W LED,	**30KS** 3000K, 80+ CRI	**90** 90° beam	**NC** New Construction, all in one	**EML** Emergency battery [7]
9024 24W LED,	**35KS** 3500K, 80+ CRI		**CP** Chicago Plenum	**EMLW** Emergency battery, wet location [7]
9033 33W LED.	**40KS** 4000K, 80+ CRI		**IC** Insulation-Contact Rated / Airtight	**TZ** 6" TechZone ceiling compatible [8]
See performance chart for precise lumen information.	**27KH** 2700K, 90+ CRI **30KH** 3000K, 90+ CRI 2 Step MacAdam ellipse is standard for all		See emergency solutions chart for EM options with these housings	[7] See emergency solutions chart for more details on EM options. [8] With NCSM housing only

SELECT ONE VOLTAGE	DIMMING DRIVER OPTIONS
120V 277V	**For use with 120V or 277V** **DIML2** 0-10V dim, 10% (provided standard) **DIML4** Lutron A 3-wire/ECO, 1% **DIML4E** Lutron 5 ECO, 5% [4] **DIML4H** Lutron H ECO, 1% Fade [4] **DIML6A** EldoLED 0-10V Lutron, 0.1% **DIML6B** EldoLED 0-10V Linear, 0.1% **DIML7** EldoLED DALI, 0.1% **DIML8** EldoLED DMX, 0.1% [5,6]
120V	**For use with 120V only** **DIML3** Lutron A 2-wire, 1% 120V only **DIML9** TRIAC 2-wire, 15% 120V only [4,5] **DIML10** ELV 2-wire, 15% [4,5] 120V only
347V	**For use with 347V only** **DIML15** 0-10V dim, 1%, 347 only

[4] N/A with 9W, [5] N/A with 33W [6] N/A with FT housing

USAI Lighting

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Revised:01/22/2016

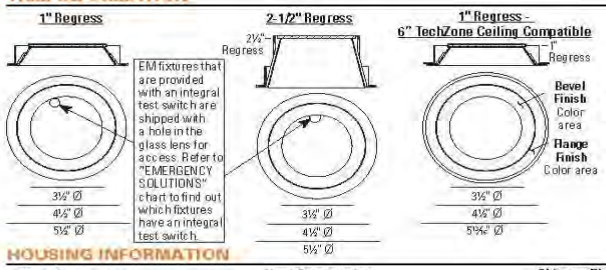
CD+M Lighting Design Group
www.cdmlight.com

Manufacturer:	USAI 'BeveLED 2.1'
Specification:	3021-W-B1-S-10-LRTD4-9024-C3-30KS-50-NCSM-VOLT-DIML2
Lamp Type:	Integral to fixture
Approved Alternates:	Edison Price, Kurt Versen

Project Number:	Sandy Springs City Center	Type: **S213**
15.54.0	Alpharetta, GA	
12-Feb-16		Page: 2 of 2

BeveLED 2.1 — DOWNLIGHT 3021

TRIM INFORMATION

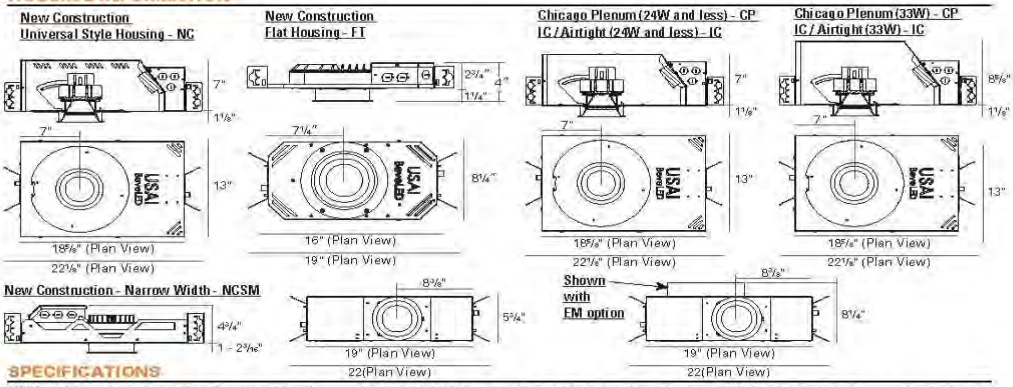


3021 Emergency Solutions

Housing	EM SERVICE	Integral Test Switch	Remote Test Switch	Inverter By Others
FT	N/A			X
NCSM*	Above ceiling access required		X	
NC, 25° or 50° optic	Through aperture	X		
NC, 90° optic	Through aperture		X	
NC Wet location	Through aperture		X	
CP	N/A			X
IC	N/A			X

* NCSM + DIML8 cannot be offered with EM

HOUSING INFORMATION



SPECIFICATIONS

TRIM: 4-1/2" round aperture with a 1" regressed bevel and 1/2" flange, retained by two mounting clips. Die cast aluminum bevel is self-flanged and is available in white, statuary bronze, black, and metalized grey finishes. Also available in black anodized or clear matte anodized bevel, with self finish or with contrasting painted flange. 2-1/2" regress available for maximum glare control. Custom color flanges available (provide RAL#).

TRIM LENS: Trim is shipped with integral solite lens standard; frosted lens available as an option.

REFLECTOR: Interchangeable precision injection molded, specular polycarbonate reflector optimized for 25°, 50° or 90° beam distribution.

FIELD REPLACEABLE LIGHT ENGINE: Available in 5 lumen packages: 9W, 12W, 18W, 24W and 33W. Engine is field replaceable through the aperture without tools. See performance chart for precise lumen output information.

COLOR: BeveLED 2.1 is available in 5 color temperatures (2200K, 2700K, 3000K, 3500K, 4000K). All color options are tightly binned for fixture-to-fixture color consistency within a 2-Step MacAdam Ellipse. 80+ color rendering index provided standard. 90+ CRI available for 2700K and 3000K CCTs.

RATED LIFE: Based on IESNA LM80-2008 50,000 hours at 70% lumen maintenance (L70).

THERMAL MANAGEMENT: Proprietary high performance aluminum die cast heatsink for maximum LED life. Ambient temperatures at fixture location should not exceed 40°C during normal operation.

FIELD REPLACEABLE DRIVER: 0-10V, 100%-10% solid state electronic constant current driver with a high power factor provided standard and sources 2mA. Specify 120V or 277V. Driver complies with IEEE C62.41 surge protection.

DIMMING OPTIONS: Multiple dimming drivers available. See compatibility chart attached. Some on-time delay may be experienced depending on control system used. Note: DIML6A logarithmic control is intended for use with Lutron control systems; DIML6B linear control is intended for use with non-Lutron controls. DIML15 and DIML8 dimming drivers source 2mA.

EMERGENCY: Fixtures provided with an integral test switch are provided with a hole in the glass lens as per the drawing above. Fixtures provided with a remote test switch are provided with a 24" lead length for location of the test switch. Fixtures that have no USAI EM option may be connected to an inverter (by others) for emergency lighting. SPECIAL NOTE FOR NCSM HOUSING: DIML8 cannot be combined with EM options in NCSM housing. See emergency solutions chart for more information on EM test switches and servicing.

MOUNTING: Butterfly brackets and adjustable nailer bars with integral nails provided. Nailer bars are extendible from 14" to 24" centers. C-channel bars are optionally available for acoustical ceiling applications.

MAXIMUM CEILING THICKNESS: As per drawings above.

CEILING CUT OUT: 5-1/16" Ø

HOUSING: Fabricated of 20 ga. galvanized steel with thru wire J-box, 4 in 4 out at min. 90°C, #12 AWG thru branch circuit wiring. IC-rated housings for use with 9W, 12W, and 18W light engines only are rated for direct contact with spray foam insulation of R-42 per inch or less. NCSM with TZ option is compatible with 6" TechZone ceiling systems. When using DIML8, NCSM housing can NOT be used with thru-branch circuit wiring.

LISTINGS: Dry/Damp. Wet location option available with B1 trim only. NRTL/CSA-US tested to UL standards. IBEW union made Energy Star Qualified under Luminaires Specification V2.0. Please see Energy Star website for exact model #s included in the listing. Please note that the following options are not Energy Star qualified: 22KS, 27KH, and 30KH light engines; B-13, B-21, and AB trim styles; Frosted lens and EM options.

WARRANTY: 5 years.

NOTES:
- Not for use in corrosive environment.
- Use of pressure washer voids warranty.

PHOTOMETRICS: Consult factory or website for IES files. Tested in accordance with IESNA LM79-2008.

USAI Lighting
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info@usailighting.com
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New Windsor, NY 12553
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Revised 01/22/2016

Manufacturer:	USAI 'BeveLED 2.1'
Specification:	3021-W-B1-S-10-LRTD4-9024-C3-30KS-50-NCSM-VOLT-DIML2
Lamp Type:	Integral to fixture
Approved Alternates:	Edison Price, Kurt Versen

CD+M Lighting Design Group
www.cdmlight.com

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SECTION 26 51 03 - ARCHITECTURAL INTERIOR LIGHTING CUTSHEETS

Type	Issue Date
S301	February 12, 2016
S302	February 12, 2016
S303	February 12, 2016
S304A	February 12, 2016
S304B	February 12, 2016
S305	February 12, 2016
S306A	February 12, 2016
S306B	February 12, 2016
S307	February 12, 2016
S308A	February 12, 2016
S308B	February 12, 2016
S309	February 12, 2016
S310	February 12, 2016
S311	February 12, 2016
S312	February 12, 2016
S312A	February 12, 2016
S313	February 12, 2016

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S301**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 1 of 4

Specification

ADVANCED HIGH CEILING

6" Cylinder Slim Series (CSS-30/CSS-50/CSS-70/CSS-90)

METEOR

Type :

Project :

Quantity:

Note :

Lead Time: 6~7 week; 4 week (2016 Q2)

The Cylinder Slim is an economical LED downlight that delivers a wide range of lumen packages from 2000 to 10400 lm with multiple optical options. The series offers optimized heat management and lumen output with its new wet location listed light engines.

Electrical

Wattage: 30W / 50W / 70W / 90W
Power Input: U (120-277V)
Operating Temperature: -13°F~112°F
Environment: UL Wet location listed; IP65
Surge Protection: 4KV
Emergency pack: Bodine BSL20LV

LED Technology

LED color: 2700K, 3000K, 3500K, 4000K, 5000K
Tuning White: 2700K ⟷ 5700K (PLEASE INQUIRE)
CRI: CRI75 for 5000K
CRI85 for 2700K, 3000K, 3500K, 4000K
CRI90 for 2700K, 3000K, 3500K (optional)
Beam Angle: 15°, 25°, 40°, 60°, 100° (with diffuser)
Rated Life: > 60,000 hours (L70)

Mounting

- Surface Mount (standard)
- Stem 2ft or 4ft (optional)
- Adjustable Aircraft Cable 10ft (optional)
- Wall Mount (optional)

Warranty

5 year limited warranty.
See www.meteor-lighting.com for details.

Dimming

- **DMX** control with high resolution 4,096 steps to <0.1% dimming level. Specifically designed to meet video broadcast and recording needs in applications such as Auditoriums, Theaters and Churches. METEOR develops its own proprietary DMX driver, which can be customized for all application requirements (optional)
- **Superior 0-10V** dims to less than 1%. Compatible with all standard dimmers (optional).
- **0-10V** driver with <5% dims level (standard)
- **TRIAC(2-wire):** Line-voltage phase control, dims to 10% (optional; **120V ONLY**)
- **3-wire:** LUTRON Hi Lume 3-wire, dims to 1% (optional)
- **ECO system:** LUTRON Hi Lume ECOsystem, dims to 1 % (optional)

Flickering is present in all light sources but METEOR has developed a propriety VX driver,which combats flickering in recorded materials.VX Driver is an advanced non-flickering technology for all dimming options,including 0-10V (std), Superior 0-10V (<10%) and DALI (<10%).

Housing

Diameter: 6.4" (164mm)
Height: 13" (330mm)
17" (432mm; DMX and Superior 0-10V version)
Material: Aluminum
Weight: 15.4 lbs (Standard version)
19.8 lbs (DMX version)

METEOR LIGHTING | 19745 Colima Rd #1-807, Rowland Heights, CA 91748 P: 213.255.2060 F: 213.596.3704 www.meteor-lighting.com

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Page 1 of 4

2016 V3

CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	METEOR '6" Cylinder Slim Series'
	Specification:	CSS-50-30K-VOLT-0-10V-25-FINISH T.B.D.-STEM MTD
	Approved Alternates:	USAI Lighting, MOD by Intense Lighting, Indy Lighting
	Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S301**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 2 of 4

Specification

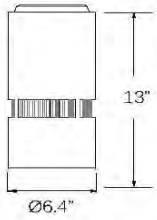
ADVANCED HIGH CEILING

6" Cylinder Slim Series (CSS-30/CSS-50/CSS-70/CSS-90)

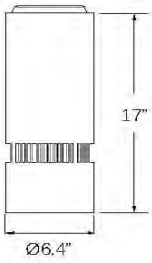
METEOR

Dimensions

Standard Version

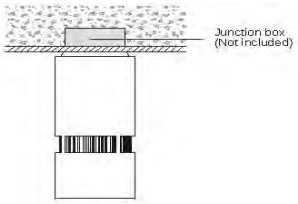


DMX Version

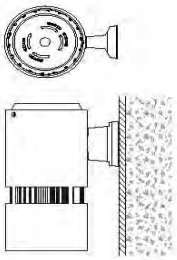


Mounting Options

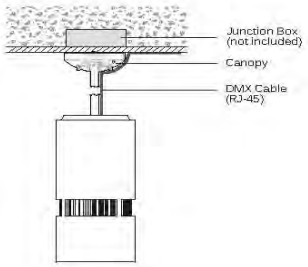
Surface Mount



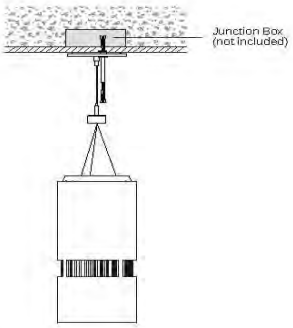
Wall Mount



Stem



Adjustable
Aircraft Cable



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2016 V1

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	Specification:	CSS-50-30K-VOLT-0-10V-25-FINISH T.B.D.-STEM MTD
	Approved Alternates:	USAI Lighting, MOD by Intense Lighting, Indy Lighting
	Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S301**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 3 of 4

ADVANCED HIGH CEILING

6" Cylinder Slim Series (CSS-30/CSS-50/CSS-70/CSS-90)

METEOR

Lumen Output Table

*Tolerance ±5%

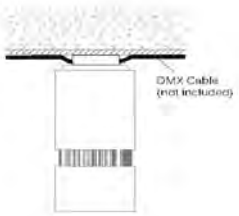
CCT	CSS-30	CSS-50	CSS-70	CSS-90
	Beam Angle: 25°			
5000K	3480 lm	5760 lm	7950 lm	10450 lm
4000K	3125 lm	5150 lm	7035 lm	9250 lm
3500K	3010 lm	5120 lm	6945 lm	9130 lm
3000K	2910 lm	5060 lm	6770 lm	8900 lm
2700K	2786 lm	4610 lm	6248 lm	8210 lm

DMX Requirements*

When placing order, please indicate DMX address. The DMX address will be listed on the back of the fixture.
The LED fixture comes equipped with male and female 5-Pin XLR Receptacles. (DMX cable NOT included.)

XLR Sockets

CONNECTION	5-PIN XLR
Common	PIN 1
Signal -	PIN 2
Signal +	PIN 3
Spare	PIN 4
Spare	PIN 5



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Manufacturer:	METEOR '6" Cylinder Slim Series'
Specification:	CSS-50-30K-VOLT-0-10V-25-FINISH T.B.D.-STEM MTD
Approved Alternates:	USAI Lighting, MOD by Intense Lighting, Indy Lighting
Lamping:	Integral to fixture

Project Number: 15.54.0 12-Feb-16	Alpharetta Conference Center & The hotel at Avalon Alpharetta, GA	Type: **S301** Page: 4 of 4

ADVANCED HIGH CEILING

6" Cylinder Slim Series (CSS-30/CSS-50/CSS-70/CSS-90)

METEOR

Ordering Guide: Ex.CSS-70-30K-U-V-40-B-SU

Model	Color Temp	Voltage	Dimming	Beam Angle	Finish	Mounting
CSS-30 CSS-50 CSS-70 CSS-90	27K[1] 2700K 30K 3000K 35K[1] 3500K 40K 4000K 50K 5000K	U 120-277V	V 0-10V	15 25 40 60 100 (must order with diffuser)	B Black W White	SU Surface Mount

Optional

SV	Superior 0-10V dim to <1%	**CRI90**[1]	Only available for 2700K, 3000K, 3500K	**SP**[2]	Surge Protector
DMX	DMX dim to <0.1%	**ST2**	Stem 2ft	**OUT**[*5]	Outdoor Rating
TRIAC	TRIAC dim to <10%	**ST4**	Stem 4ft	**NAT**[*6]	Natatorium Rating
3-wire	LUTRON 3-wire dim to <1%	**AD10**	Adjustable Aircraft Cable 10ft	**EMP**	Emergency Pack
ECO	LUTRON ECO system dim to <1%	**WM**	Wall Mount	**DF**[4]	Diffuser
TuningW[3]	Tuning White: 2700K ←→ 5700K				

Notes:
[1] Additional lead time required.
[2] Surge protection for up to 10kV. Applicable for unstable mains or facilities using high power machineries.
[3] **PLEASE INQUIRE** before order.
[4] Please factor in change in lumen output with diffuser (-20% with 100°; -12% with other angles).
[5] Option is not compatible with DMX.
[*5] Outdoor rating: Coating and wiring will be changed to high UV resistants and corrosion resistant materials for long term operation in outdoor environments.
[*6] Natatorium rating: Coating and sealant will be changed to high corrosion resistant materials to prevent damage from long term exposure to chlorine vapors.

Compatible TRIAC dimmer list

LUTRON PART NO.

MRF2-6ND-120	HQRD-6NA	RRD-10ND	SZ-6ND
RRD-6NA	HQRD-6ND	HQRD-10ND	

Emergency pack Lumen Output Table

CCT	2700K	3000K	4000K	5000K
Lumen	1640 lm	1760 lm	1890 lm	1950 lm

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CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	METEOR '6" Cylinder Slim Series'
	Specification:	CSS-50-30K-VOLT-0-10V-25-FINISH T.B.D.-STEM MTD
	Approved Alternates:	USAI Lighting, MOD by Intense Lighting, Indy Lighting
	Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S302**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 1 of 2

BeveLED 2.1

PROJECT INFORMATION

PROJECT _____

DATE _____

TYPE _____

ADJUSTABLE 3231

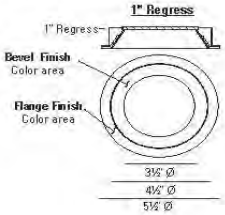
1" Regress

BeveLED 2.1 Recessed Adjustable - BeveLED 2.1 is the most complete recessed LED downlight product family available from USAI Lighting, now with more BeveLED trim finishes, LED classic white color temperatures, innovative housing styles, and dimming driver options than before. With industry-leading performance, BeveLED 2.1 can provide a solution for any project - commercial, corporate and residential installa-

DELIVERED PERFORMANCE

BeveLED 2.1 ADJUSTABLE		9 Watts		12 Watts		16 Watts		24 Watts		33 Watts	
	Color Rendering Index	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI
25° Performance Data	Lumens per Watt	91	72	78	60	78	61	72	56	64	52
	Source Lumens	1150	900	1300	1025	1725	1350	2400	1875	3025	2350
	Delivered Lumens	**825**	**650**	**925**	**725**	**1250**	**975**	**1725**	**1350**	**2175**	**1700**
10° Performance Data	Lumens per Watt			83	71	84	70	78	65	71	59
	Source Lumens			1150	1000	1575	1300	2175	1800	2725	2275
	Delivered Lumens			**1000**	**850**	**1350**	**1125**	**1875**	**1550**	**2350**	**1950**
	Color Consistency	2-Step MacAdam Ellipse									

Note: 25° data includes solite glass lens; 10° does not include lens.



CCT MULTIPLIER	2200K	2700K		3000K		3500K	4000K
Color Rendering Index	80+ CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	80+ CRI
Multiplier for Lumen Output	0.72	0.94	0.78	1.00	.78	1.00	1.06

90+ CRI is not available for 2200K, 3500K, or 4000K

HOW TO SPECIFY

Ordering Example: Specify trim code and housing code to order. Example : **3231W - B1 - S - 10 - LRTA4 - 8412 - C3 - 27KS - 25 - NC - 277V - DIML2 - CB27**

TRIM ORDERING INFORMATION

TRIM: 3231 _____ - BEVEL STYLE _____ - LENS _____ - FLANGE FINISH _____

3231 Round Adjustable 1" Regress	W Wet location[1]	B1 1" Regress Bevel, Painted Die Cast Matches Flange Finish AB1 1" Regress Bevel, Black Anodized AC1 1" Regress Bevel, Clear Matte Anodized	N No Glass (use for 10°) S Solite (use for 25°) F Frosted C Clear	01 Clear Matte (AC Bevel only) 02 Black Anodized (AB Bevel only) 10 White 13 Statuary Bronze 21 Black 28 Metalized Grey RAL Custom Color (specify RAL #)

[1] Wet location, use with B1 trims only.

OPTICAL ACCESSORIES _____ (Order separately)

AL10E AL15E AL30E AS61E AL20F AL30F AL40F AL55F AL80F AS61F	Refer to optical accessories matrix on next page for resulting beamspreads when accessory lens is combined with 10° and 25° optics

Clearly specify quantity in your order

HOUSING ORDERING INFORMATION

HOUSING CODE: LRTA4 - WATTAGE _____ - ENGINE CODE _____ - COLOR _____ - REFLECTOR _____ - HOUSING TYPE _____ - SELECT ONE VOLTAGE _____ - DIMMING DRIVER OPTIONS _____ - ACCESSORIES _____

HOUSING CODE	WATTAGE	ENGINE CODE	COLOR	REFLECTOR	HOUSING TYPE	SELECT ONE VOLTAGE	DIMMING DRIVER OPTIONS	ACCESSORIES
LRTA4	8109 9W LED 8112 12W LED 8116 16W LED 8120 24W LED 8133 33W LED	C3	22KS 2200K, 80+ CRI 27KS 2700K, 80+ CRI 30KS 3000K, 80+ CRI 35KS 3500K, 80+ CRI 40KS 4000K, 80+ CRI 27KH 2700K, 90+ CRI 30KH 3000K, 90+ CRI	25 25° beam	NC New Construction, all in one CP Chicago Plenum IC Insulation-Contact Rated / Airtight See emergency solutions chart for EM options with these housings.	120V 277V	For use with 120V or 277V DIML2 0-10V dim, 10% (provided standard) DIML3 Lutron A 3-wire/ECO, 1% DIML5E Lutron 5 ECO, 5%[2] DIML5H Lutron H ECO, 1% Fade[2] DIML6A EldoLED 0-10V/Lutron, 0.1% DIML6B EldoLED 0-10V Linear, 0.1% DIML7 EldoLED DALI, 0.1% DIML8 EldoLED DMX, 0.1%[3]	CB27 27" C-Channel Bars CB52 52" C-Channel Bars EML Emergency battery[4] EMLW Emergency battery, wet location[4] [4] See emergency solutions chart for more details on EM options.
	8412 12W LED 8116 16W LED 8120 24W LED 8133 33W LED See performance chart for precise lumen information.	C2	27KS 2700K, 80+ CRI 30KS 3000K, 80+ CRI 35KS 3500K, 80+ CRI 40KS 4000K, 80+ CRI 27KH 2700K, 90+ CRI 30KH 3000K, 90+ CRI 2 Step MacAdam ellipse is standard for all	10 10° beam		120V	For use with 120V only DIML3 Lutron A 2-wire, 1% 120V only[2,3] DIML9 TRIAC 2-wire, 15% 120V only[2,3] DIML10 ELV 2-wire, 15% 120V only[2,3]	
						347V	For use with 347V only DIML15 0-10V dim, 1% 347 only	

[2] N/A with 9W
[3] N/A with 33W

USAI Lighting

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Revised 01/04/2016

CD+M Lighting Design Group
www.cdmlight.com

Manufacturer:	USAI 'BeveLED 2.1'
Specification:	3231-B1-S-10-LRTA4-8433-C3-30KS-25-NC-VOLT-DIML6*
Approved Alternates:	Edison Price, Kurt Versen, Kirlin
Lamping:	Integral to fixture

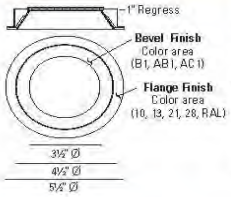
Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S302**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 2 of 2

BeveLED 2.1

ADJUSTABLE 3231

ADDITIONAL TRIM INFORMATION

1" Regress



BeveLED 2.1 Optical Accessories Matrix

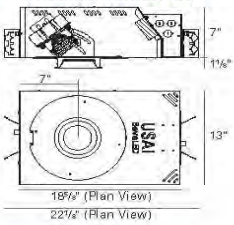
if you want...	and you have... 10°	25°
15° beam	ALT0E	N/A
20° beam	AL15E	N/A
25° beam	AL30E	N/A
35° beam	N/A	AL20F
40° beam	N/A	AL30F
45° beam	N/A	AL40F
55° beam	N/A	AL55F
60° beam	N/A	AL80F
20x60° beam	AS61E	N/A
40x60° beam	N/A	AS61F
	size E	size F

3131 Emergency Solutions

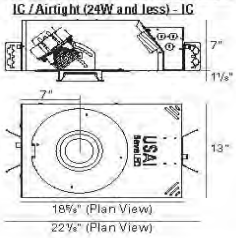
Housing	EM SERVICE	Integral Test Switch	Remote Test Switch	Inverter By Others
NC	Through aperture		X	
CP	N/A			X
IC	N/A			X

HOUSING INFORMATION

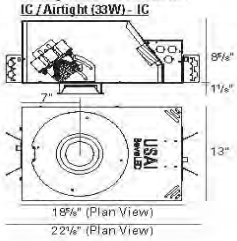
New Construction
Universal Style Housing - NC



Chicago Plenum (24W and less) - CP
IC / Airtight (24W and less) - IC



Chicago Plenum (33W) - CP
IC / Airtight (33W) - IC



SPECIFICATIONS

TRIM: 4-1/2" round aperture with a 1" regressed bevel and 1/2" flange, retained by two mounting clips. Die cast aluminum bevel is self-flanged and is available in white, statuary bronze, black, and metalized grey finishes. Also available in black anodized or clear matte anodized bevel, with self finish or with contrasting painted flange. Custom color flanges available (provide RAL#).

TRIM LENS: 25° trim is shipped with integral solite lens. 10° does not come with a solite lens unless selected as an option. Frosted lens option available for both. 10° wet location is provided with a clear lens.

REFLECTOR: Interchangeable precision injection molded specular polycarbonate reflector optimized for 10° or 25° beam distribution. Note: 10° optic requires dedicated 10° light engine.

ADJUSTMENT: True hot aiming with center beam optics is adjustable, with a completely tool-less mechanism. 0°-40° lockable vertical tilt with 362° lockable rotation.

FIELD REPLACEABLE LIGHT ENGINE: Available in 5 lumen packages: 9W, 12W, 16W, 24W and 33W. Engine is field replaceable through the aperture without tools. See performance chart for precise lumen output information.

COLOR: BeveLED 2.1 is available in 5 color temperatures (2200K, 2700K, 3000K, 3500K, 4000K). All color options are tightly binned for fixture-to-fixture color consistency within a 2-Step MacAdam Ellipse. 80+ color rendering index provided standard. 90+ CRI available for 2700K and 3000K CCTs.

RATED LIFE: Based on IESNA LM80-2008 50,000 hours at 70% lumen maintenance (L70).

THERMAL MANAGEMENT: Proprietary high performance aluminum die cast heatsink for maximum LED life. Ambient temperatures at fixture location should not exceed 40°C during normal operation.

FIELD REPLACEABLE DRIVER: 0-10V, 100%-10% solid state electronic constant current driver with a high power factor provided standard and sources 2mA. Specify 120V or 277V. Driver complies with IEEE C62.41 surge protection.

DIMMING OPTIONS: Multiple dimming drivers available. See compatibility chart attached. Some on-time delay may be experienced depending on control system used. Note: DIML6A logarithmic control is intended for use with Lutron control systems; DIML6B linear control is intended for use with non-Lutron controls. DIML15 and DIML6 dimming drivers source 2mA.

EMERGENCY: Fixtures provided with a remote test switch are provided with a 24" lead length for location of the test switch. Fixtures that have no USAI EM option may be connected to an inverter (by others) for emergency lighting. See emergency solutions chart for more information on EM test switches and servicing.

MOUNTING: Butterfly brackets and adjustable nailer bars with integral nails provided. Nailer bars are extendible from 14" to 24" centers. C-channel bars are optionally available for acoustical ceiling applications.

MAXIMUM CEILING THICKNESS: As per drawings above.

ACCESSORY HOLDER: Snap in accessory holder shipped with fixture.
10° accepts "E" size lens, maximum 2.
25° accepts "F" size lens, maximum 2.

HOUSING: Fabricated of 20 ga. galvanized steel with thru wire J-box, 4 in 4 out at min. 90°C, #12 AWG thru branch circuit wiring. IC-rated housings for use with 9W, 12W, and 16W light engines only are rated for direct contact with spray foam insulation of R-42 per inch or less.

CEILING CUT OUT: 5-1/16"Ø

LISTINGS: Dry/Damp. Wet location option available with B1 trim only. NRTL/CSA-US tested to UL standards. IBEW union made. Energy Star Qualified under Luminaires Specification V2.0. Please see Energy Star website for exact model #'s included in the listing. Please note that the following options are not Energy Star qualified: 22KS, 27KH, and 30KH light engines; B-13, B-21, and AB trim styles; Frosted lens and EM options.

WARRANTY: 5 years

NOTES:
- Not for use in corrosive environment.
- Use of pressure washer voids warranty.

PHOTOMETRICS: Consult factory or website for IES files. Tested in accordance with IESNA LM79-2008.

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Revised 01/04/2016

CD+M Lighting Design Group www.cdmlight.com	Manufacturer:	USAI 'BeveLED 2.1'
	Specification:	3231-B1-S-10-LRTA4-8433-C3-30KS-25-NC-VOLT-DIML6*
	Approved Alternates:	Edison Price, Kurt Versen, Kirlin
	Lamping:	Integral to fixture

Project Number:	Alpharetta Conference Center & The hotel at Avalon	Type: **S303**
15.54.0		
12-Feb-16	Alpharetta, GA	Page: 1 of 2

BeveLED 2.1

PROJECT INFORMATION

PROJECT _____

DATE _____

TYPE _____

DOWNLIGHT 3021

1" Regress | 2-1/2" Regress

BeveLED 2.1 Recessed Downlight - BeveLED 2.1 is the most complete recessed LED downlight product family available from USAI Lighting, now with more BeveLED trim finishes, LED classic white color temperatures, innovative housing styles, and dimming driver options than before. With industry-leading performance, BeveLED 2.1 can provide a solution for any project - commercial, corporate and residential installations.

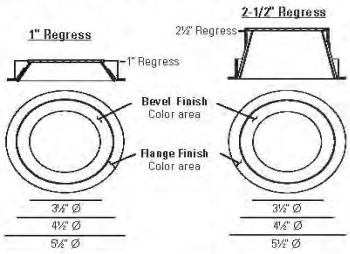
DELIVERED PERFORMANCE

BeveLED 2.1 DOWNLIGHT	9 Watts		12 Watts		16 Watts		24 Watts		33 Watts	
Color Rendering Index	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI
Lumens per Watt	93	68	86	67	86	67	80	63	71	57
Source Lumens	1150	900	1300	1025	1725	1350	2400	1875	3025	2350
Delivered Lumens	**775**	**600**	**1025**	**800**	**1375**	**1075**	**1925**	**1500**	**2400**	**1875**
Color Consistency	2-Step MacAdam Ellipse									

Performance based on 3000K

CCT MULTIPLIER	2200K	2700K		3000K		3500K	4000K
Color Rendering Index	80+ CRI	80+ CRI	90+ HIGH CRI	80+ CRI	90+ HIGH CRI	80+ CRI	80+ CRI
Multiplier for Lumen Output	0.72	0.94	0.78	1.00	.78	1.00	1.06

90+ CRI is not available for 2200K, 3500K, or 4000K



HOW TO SPECIFY

Ordering Example: Specify trim code and housing code to order: Example : **3021W - B1- S - 10 - LRTD4 - 9012 - C3 - 27KS - 50 - NC - 277V - DIML2 - CB27**

TRIM ORDERING INFORMATION

TRIM	OPTION		BEVEL STYLE		LENS	FLANGE FINISH	
3021	_____	-	_____	-	_____	-	_____
3021 Round Downlight 1" or 2-1/2" Regress	**W**	Wet location [1]	**B1**	1" Regress Bevel, Painted Die Cast Matches Flange Finish	**S** Solite (provided standard)	**01**	Clear Matte (AC Bevel only)
	EML	Integral Emergency Test Switch [2]	**AB1**	1" Regress Bevel, Black Anodized	**F** Frosted	**02**	Black Anodized (AB Bevel only)
	TZ	6" TechZone ceiling compatible (NCSM only)	**AC1**	1" Regress Bevel, Clear Matte Anodized		**10**	White
			B2	2-1/2" Regress Bevel, Painted Die Cast Matches Flange Finish		**13**	Statuary Bronze
			AB2	2-1/2" Regress Bevel, Black Anodized [3]		**21**	Black
			AC2	2-1/2" Regress Bevel, Clear Matte Anodized [3]		**28**	Metalized Grey
						RAL	Custom Color (specify RAL #)

[1] Wet location, use with B1 trims only.
[2] See table on page 2
[3] Not for use with FT or NCSM housing.

HOUSING ORDERING INFORMATION

HOUSING CODE	WATTAGE	ENGINE CODE	COLOR	REFLECTOR	HOUSING TYPE	SELECT ONE VOLTAGE	DIMMING DRIVER OPTIONS	ACCESSORIES
LRTD4 -	_____ -	C3 -	_____ -	_____ -	_____ -	_____ -	_____ -	_____
LRTD4	**9009** 9W LED, **9012** 12W LED, **9016** 16W LED, **9024** 24W LED, **9033** 33W LED, See performance chart for precise lumen information.	C3	**22KS** 2200K, 80+ CRI **27KS** 2700K, 80+ CRI **30KS** 3000K, 80+ CRI **35KS** 3500K, 80+ CRI **40KS** 4000K, 80+ CRI **27KH** 2700K, 90+ CRI **30KH** 3000K, 90+ CRI 2 Step MacAdam ellipse is standard for all	**25** 25° beam **50** 50° beam **90** 90° beam	**FT** Flat Housing, New Construction **NCSM** New Construction, Narrow Width **NC** New Construction, all in one **CP** Chicago Plenum **IC** Insulation-Contact Rated / Airtight See emergency solutions chart for EM options with these housings.	**120V** **277V**	**For use with 120V or 277V** **DIML2** 0-10V dim, 10% (provided standard) **DIML4** Lutron A 3-wire/ECO, 1% **DIML4E** Lutron 5 ECO, 5% [4] **DIML4H** Lutron H ECO, 1% Fade [4] **DIML6A** EldoLED 0-10V Lutron, 0.1% **DIML6B** EldoLED 0-10V Linear, 0.1% **DIML7** EldoLED DALI, 0.1% **DIML8** EldoLED DMX, 0.1% [5,6]	**CB27** 27" C-Channel Bars **CB52** 52" C-Channel Bars **EML** Emergency battery [7] **EMLW** Emergency battery, wet location [7] **TZ** 6" TechZone ceiling compatible [8]
						120V	**For use with 120V only** **DIML3** Lutron A 2-wire, 1% 120V only **DIML9** TRIAC 2-wire, 15% 120V only [4,6] **DIML10** ELV 2-wire, 15% [4,5] 120V only	
						347V	**For use with 347V only** **DIML15** 0-10V dim, 1%, 347 only	

[4] N/A with 9W.
[5] N/A with 33W
[6] N/A with FT housing
[7] See emergency solutions chart for more details on EM options.
[8] With NCSM housing only

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Revised 01/22/2016

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