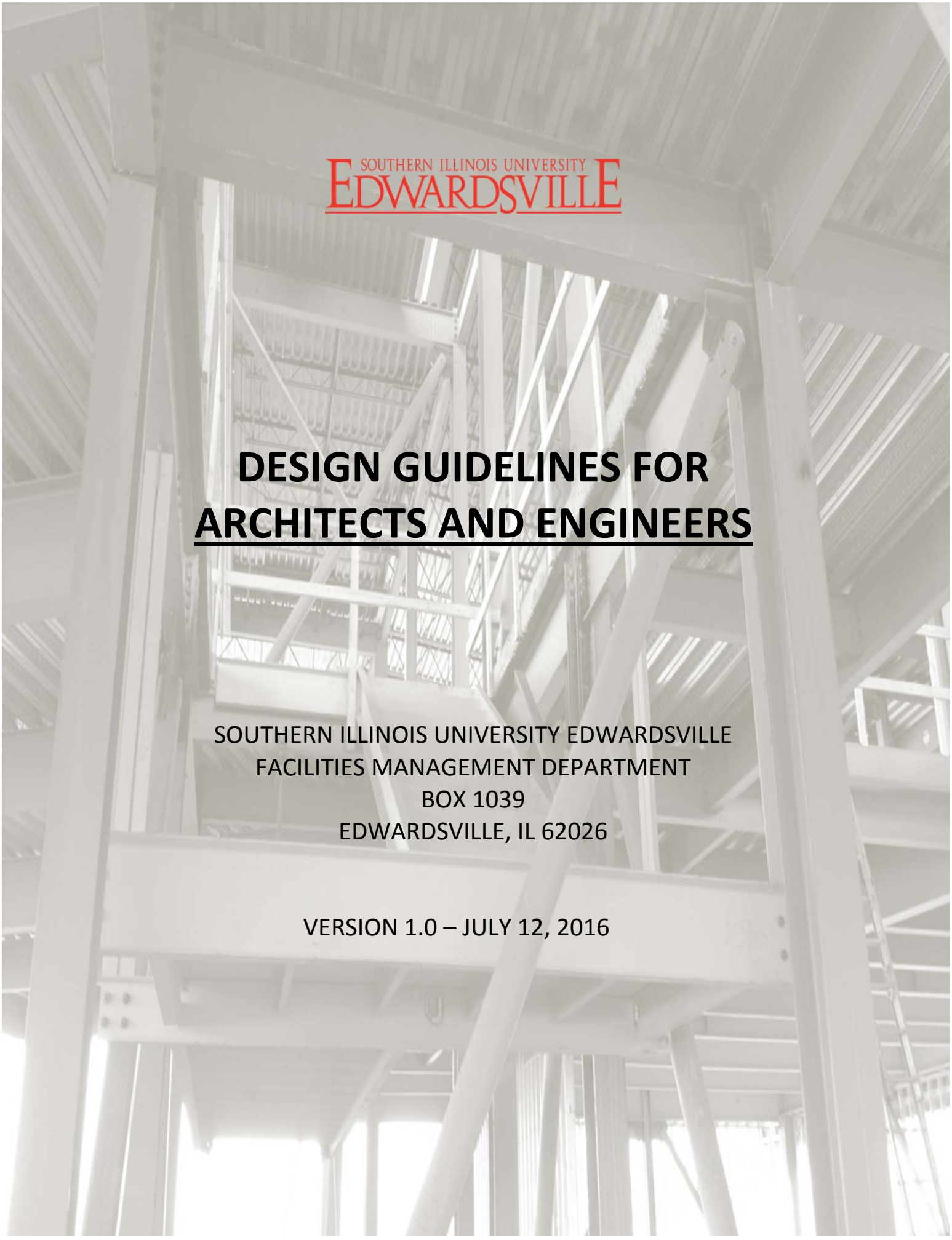

SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE

DESIGN GUIDELINES FOR ARCHITECTS AND ENGINEERS

SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE
FACILITIES MANAGEMENT DEPARTMENT
BOX 1039
EDWARDSVILLE, IL 62026

VERSION 1.0 – JULY 12, 2016

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COVER SHEET

PART 1 - GENERAL

1.1 DESCRIPTION

A. State CDB Project: Utilize CDB's master.

B. SIUE Project: Provide for specific project.

PART 2 - PRODUCTS (Not Used)

END OF SECTION

SPACE PLANNING GENERAL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Family/Single Occupancy Restrooms: For new construction and major renovations, at least two gender-neutral, family restroom is to be provided in each building.

B. Classrooms: Varies by department and class size, based on an occupancy count of 20 SF per occupant.

C. Office Space Planning:

Position Description	**Square Footage Office Module**
Chancellor	700
Provost	600
Vice Chancellor	350
Dean	300
Assoc./Asst. Administrator	150
Director/Chair	150
Asst. Director	120
Faculty	120
Instructors, Lecturers	120
Adjunct Faculty	35
Studio Faculty	225
Emeritus Faculty	65
Administrative Staff	120
Clerical/Technical Staff	120
Graduate Assistants	50
Fellows	80
Student Worker	25

1. Office space needs are to be further developed by incorporating the following:

   a. Faculty or staff with appointments 50% or greater need a full office module.
   b. Adjunct faculty and graduate students share office space and are provided a smaller module of space.
   c. Office space is provided for contract employees who have administrative duties.
   d. An average number of student workers are included in offices, where identified, by allocating space for a small work area.

e. Conference room space is allocated at 18 square feet per FTE faculty, and administrative staff.
f. Office lounge space is allocated at 5 square feet per FTE for all personnel.
g. An office service space allocation (i.e. files, supply storage, work room) ranging from 10% to 20% of the total calculated office space need is provided for most departments. Certain offices are provided a supplemental office support allocation for:

- Reception and waiting space
- Processing space
- Additional departmental storage
- Larger office modules are provided for faculty in departments who use their office as studio space.

D. Waste Disposal:

1. Site Requirements: Verify size and number of dumpsters needed on a per project basis.

E. Emergency Management and Safety: Refer to SIUE's Emergency Management and Safety Policies for additional information:

Introduction	Fall Protection
Confined Space Entry	Forklift & Pallet Lift Safety
Contractor Safety	Handling & Sampling of Infectious Waste
Electrical Safety	Hearing Conservation Program
Energy Control/Lockout/Tagout	Machine Guarding
Eyewash & Shower Stations	Personal Protection (eye/face; foot; hand; head; hearing; ppe, respiratory, apparel)
Exposure Monitoring	

PART 2 - PRODUCTS (Not Used)

END OF SECTION

APPLICABLE CODES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Building Codes: The following Codes may change, confirm list of codes with SIUE Facilities Management.

1.	2018	INTERNATIONAL BUILIDNG CODE
2.	2014	ILLINOIS PLUMBING CODE (77 ILL. ADM. CODE 890)
3.	2018	INTERNATIONAL PLUMBING CODE
4.	2018	INTERNATIONAL ENERGY CONSERVATION CODE
5.	2018	ILLINOIS ACCESSIBILITY CODE (71 ILL. ADM. CODE 400)
6.	2018	INTERNATIONAL FUEL GAS CODE
7.	2018	INTERNATIONAL MECHANICAL CODE
8.	2018	INTERNATIONAL FIRE CODE
9.	2010	ADA SAD DOJ
10.	2017	NATIONAL ELECTRIC CODE
11.	2018	NFPA 101

PART 2 - PRODUCTS (Not Used)

END OF SECTION

CONTRACT DRAWINGS GENERAL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Drawings

1. Size: Architectural D size.
2. Deliverable: Print and electronic. Provide PDF and ACAD files of drawings. Provide PDF and Word files of specifications, addendum, etc.

PART 2 - PRODUCTS (Not Used)

END OF SECTION

PROJECT MANUAL GENERAL

PART 1 - GENERAL

1.1 DESCRIPTION

A. A/E to provide to SIUE Purchasing:

1. A bond set of drawings and specifications. Do not bind purchasing forms in project manual.
2. A CD containing a PDF copy of:

    a. Drawings.
    b. Project Manual.
    c. Purchasing forms.

B. Format:

1. Project Manuals to be in CSI format.
2. Technical section format to describe multiple prime contractor responsibilities. Follow Illinois State CDB format.

C. Sole Source Products:

1. SIUE Purchasing will provide form to be completed by A/E.
2. Only sole source items approved by Purchasing may be incorporated into the project.
3. Purchasing's approval of a sole source only applies to that specific project. Approval for a sole source item needs to be requested on each individual project.

D. A potential bidder cannot assist in the writing of specifications for bidding. Potential bidders cannot assist with cost estimation or any parts of potential projects. This is a direct violation of the Procurement Code.

E. SIUE prequalifies contractors on an annual basis. Send specialized contractor information to Purchasing to get included.

1. SIUE Purchasing can provide project specific prequalification for projects expected to take over a year.
2. Project specific pre-qualification of contractors based on experience and past performance may be performed for specialized or complex work in advance of solicitation of bids. Consult with SIUE Facilities Management and Purchasing.

F. Projects in excess of $250,000 must be set up for multiple prime contractors, including the following as applicable to the project. Separate prime contracts are required if that division of work exceeds the current State of Illinois construction bid limit.

1. General.
2. Electrical.

3. Heating.
4. Plumbing.
5. Ventilation.
6. Fire Protection.

G. SIUE Purchasing prepares all Addendum.

1. All bidders questions are to go through SIUE Purchasing. Bidders can be disqualified if they contact anybody except purchasing with questions during the bidding process.
2. Purchasing provides A/E with form for answering questions.

H. Substitutions:

1. Acceptable substitutions are to be issued via addendum.
2. Rejected substitution requests require the A/E to contact the requestor to inform them of the rejection and provide reasoning for such determination.

PART 2 - PRODUCTS (Not Used)

END OF SECTION

DIVISION 00 SECTIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. State CDB Project: Utilize CDB's master sections.

B. SIUE Project: Utilize SIUE sections as provided by Purchasing department.

1. SIUE Purchasing will provide A/E with front end checklist.
2. All pricing requirements to be in the front end documents. Do not put pricing requirements in the technical sections.
3. Bind Division 00 sections with rest of project manual.
4. Owner/Contractor Agreement: AIA form with SIUE Addendum.
5. Prevailing Wage: Required with PLA.

PART 2 - PRODUCTS (Not Used)

END OF SECTION

SECTION 000105 – CERTIFICATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. SIUE Project: Provide certification page for specific project.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 000105

SECTION 000107 – SEALS

PART 1 - GENERAL

1.1 DESCRIPTION

A. SIUE Project: Provide seals page for specific project.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 000107

SECTION 003126 – EXISTING HAZARDOUS MATERIAL INFORMATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. SIUE will provide investigation reports or request accomplishment by the architect-engineer.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 003126

SECTION 015000 – TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION

A. State CDB Project: Utilize CDB's master section.

B. SIUE Project: Provide section as required for specific project.

C. Protect existing facilities (buildings, paving, sidewalks, landscaping, turf areas, etc.) from damage. Restore damage items to original condition or better to the satisfaction of SIUE.

1. Repair sidewalks and areas along sidewalks damaged or rutted during construction.

1.2 USE CHARGES

A. SIUE owns water, sewage, gas, and electric. No use charges. Tap into existing where permitted by SIUE. Coordinate tie-ins with SIUE Facilities Management project personnel.

1.3 SUPPORT FACILITES

A. Field Offices and Storage Sheds: Location and restrictions to be shown in the Construction Documents. Coordinate with SIUE project personnel.

B. Construction Parking: Use SIUE designated areas of existing SIUE parking areas. Contractor parking passes are available from SIUE Facilities Management Department.

C. Existing Elevator Use: Use of Owner's existing elevators will be permitted depending on size and weight of load. Existing elevators are to be cleaned and maintained in a condition acceptable to SIUE.

D. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to SIUE.

E. Existing Restroom Usage: Use of Owner's existing restrooms will not be permitted. Contractor is to provide temporary toilets, wash facilities, and drinking water for use of construction personnel.

F. Temporary Walking Paths and Temporary Roadways: Coordinate with Facilities Management project personnel. Temporary walking paths and temporary roadways should be clearly noted and called out on construction drawings.

1.4 TEMPORARY UTILITY WORK

A. Follow SIUE procedures, available from SIUE, for the following:

1. PPE.
2. Tag-out.
3. Arc Flash.
4. Confined space access.
5. Barriers – (Refer to Specifications)

a. General Contractor shall provide and maintain security fencing along the perimeter of the construction area.
b. Provide open mesh fence and gates in accordance to the specifications for the project.
c. Remove fencing and restore or repair damaged areas at the end of the construction period.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 015000

SECTION 017413 – PROGRESS CLEANING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Progress Cleaning: Clean Project site and work areas daily, including common areas. Dispose of materials lawfully.

1. Site: Maintain Project site free of waste materials and debris.
2. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 017413

SECTION 017419 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 DESCRIPTION

A. State CDB Project: Utilize CDB's master section.

B. SIUE Project: Coordinate with SIUE PM.

1. Remove all debris and waste building material from site in legal manner. Do not bury any waste on site.
2. Removed materials shall be recycled off-site to the maximum extent practical and the weights of recycled materials reported to SIUE.

C. Coordinate section with LEED certification requirements.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 017419

SECTION 017823 – OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 DESCRIPTION

A. State CDB Project: Utilize CDB's master section.

B. SIUE Project: Provide section as required for specific project.

1. A/E shall consolidate and organize in binders or other agreed upon format, all contractor submitted operation and maintenance manuals, equipment information, and shop drawings for future use and reference by University facilities management staff. Documents shall also be submitted in electronic formats to be specified by the University. For asbestos abatement projects and other projects that included asbestos abatement, the A/E shall complete an Asbestos Abatement Project Summary Report and forward it to the University PM.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 017823

SECTION 017839 – PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. State CDB Project: Utilize CDB's master section.

B. SIUE Project: Provide section as required for specific project.

1. A/E shall submit to the University two sets of revised contract documents labeled "Record Construction Drawings," which show all changes reported by the contractor(s), and all changes made by change orders, addenda, and clarifications made by the A/E during construction. Documents shall also be submitted in electronic formats to be specified by the University. Verify requirement with the University PM.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 017839

SECTION 018113 – SUSTAINABLE DESIGN REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. State CDB Project: All new State-funded building construction and major renovations of existing State-owned facilities are required to seek LEED certification. New buildings and major renovations of 10,000 square feet or more must achieve the Silver building rating of the Leadership in Energy and Environmental Design's rating system for new commercial construction and major renovation projects, as established by the United States Green Building Council. USGBC LEED certification is required. Coordinate requirements with CDB Project Manager and SIUE.

B. SIUE Project: Follow State CDB requirements.

C. Consult with SIUE on application of LEED criteria to projects not otherwise required to seek LEED Silver certification.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 018113

SECTION 024119 – SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Hazardous material removal to be by SIUE under separate construction contract. Either prior to or if found during construction.

B. Generally, the salvaging of materials is project specific. In most cases toilet fixtures and accessories will not be returned to SIUE. Door hardware, especially locksets and cores, are always returned to SIUE.

C. Noise Control: As required for specific project. Coordinate requirements for noise control with SIUE.

D. Explosives: Use of explosives is not permitted.

E. Dust Control: Provide appropriate measures to minimize exterior dust and contain interior sites to prevent construction dust from entering mechanical systems and adjacent spaces.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 024119

SECTION 033000 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Minimum Strength: Normally 4,000 PSI.

B. If concrete floors are to be sealed, provide product information and maintenance procedures to SIUE.

C. Concrete Door Stoops: Slope away from exterior doors. Provide heave protection for stoops.

D. Concrete Tests:

1. SIUE to engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
2. Testing: During and after construction.

PART 2 - PRODUCTS

A. Steel products, such as rebar, shall be manufactured or produced in the USA unless President of University grants exception (30 ILCS 565).

END OF SECTION 033000

SECTION 033543 – POLISHED CONCRETE FINISHING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Due to experience with poor quality installations, polished concrete floors are not preferred for typical floor areas. Limited use shall be considered only after consultation and approval of SIUE.

B. Refer to other flooring materials for preferred flooring.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 033543

SECTION 042613 – MASONRY VENEER

PART 1 - GENERAL

1.1 DESCRIPTION

A. Proposed exterior wall materials and colors require the approval of the Campus Architect. Acceptable materials include:

1. Brick masonry.
2. Stone cladding.
3. Precast concrete.

PART 2 - PRODUCTS

2.1 BRICK

A. Manufacturer: No substitute. SIUE will provide single source letter

1. Richards Brick; Edwardsville Red #1A66 Blend.

2.2 MORTAR

A. Color: Match Solomon Colors, Inc.; SGS 45H Maroon.

END OF SECTION 042613

SECTION 044200 – EXTERIOR STONE CLADDING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Proposed exterior wall materials and colors require the approval of the Campus Architect. Acceptable materials include:

1. Brick masonry.
2. Stone cladding.
3. Precast concrete.

PART 2 - PRODUCTS

2.1 STONE CLADDING

A. To be selected on a project basis, with SIUE approval.

END OF SECTION 044200

DIVISION 05 METALS

PART 1 - GENERAL – STRUCTURAL STEEL

1.1 DESCRIPTION

A. Each contract for the construction, reconstruction, alteration, repair, improvement or maintenance of public works made by a public university shall contain a provision that steel products used or supplied in the performance of the contract or any subcontract thereto shall be manufactured or produced in the United States in accordance with the Steel Products Procurement Act (30 ILCS 565). For example, a finished supply item that contains a steel component, such as an HVAC system, is not considered a steel product and would not be subject to the Act, but a steel I-beam would be subject to the Act.

PART 2 - PRODUCTS (Not Used)

END OF SECTION

SECTION 055213 – PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Consider measures to prevent skateboard grind where appropriate.

B. Stainless steel at atriums, lobbies, and key feature elements, handrails are preferred (especially for exterior use). Painted railings / handrails in existing stairs and secondary locations.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel products shall be manufactured or produced in the USA unless President of University grants exception (30 ILCS 565).

END OF SECTION 055213

SECTION 061053 – MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide blocking for owner furnished and installed items including but not limited to:

1. Projection screens.
2. Toilet accessories.
3. Wall mounted shelving.
4. Wall mounted cabinets and casework.
5. TV monitors and/or video monitors.
6. Miscellaneous wall mounted items.
7. White boards and chalk boards.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 061053

SECTION 064113 – WOOD-VENEER-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL (Not Used)

PART 2 - PRODUCTS

2.1 LOCKS

A. Millwork cabinet locks can be standard cam locks.

1. Provide spare keys and blanks.
2. Best cores for millwork cabinet locks is preferred, but not required. At a minimum, the millwork company is to provide the “standard small format” lock keying/coding information. SIUE Key Control should be consulted regarding master keying for small format locks on a project specific basis.

END OF SECTION 064113

SECTION 064116 – PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL (Not Used)

PART 2 - PRODUCTS

2.1 LOCKS

A. Millwork cabinet locks can be standard cam locks.

1. Provide spare keys and blanks.
2. Best cores for millwork cabinet locks is preferred, but not required. At a minimum, the millwork company is to provide the “standard small format” lock keying/coding information. SIUE Key Control should be consulted regarding master keying for small format locks on a project specific basis.

END OF SECTION 064116

SECTION 066400 – PLASTIC PANELING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide glass-fiber-reinforced plastic paneling wall protection at all mop sinks.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 066400

SECTION 072700 – AIR BARRIERS

PART 1 - GENERAL

1.1 QUALITY ASSURANCE

A. The air barrier shall be joined in an airtight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep. Connection shall be made between:

1. Foundation and walls.
2. Walls and windows or doors.
3. Different wall systems.
4. Wall and roof.
5. Wall and roof over unconditioned space.
6. Walls, floor and roof across construction, control and expansion joints.
7. Walls, floors and roof to utility, pipe and duct penetrations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction shall be capable of performing as a continuous air barrier. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

B. Air Barrier Assembly Air Leakage: Not to exceed 0.01 cfm x sq. ft. of surface area at 1.57 lbf/sq. ft.; ASTM E 2357.

END OF SECTION 072700

SECTION 075323 – ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING

PART 1 - GENERAL

1.1 DESCRIPTION

A. TPO roofing preferred.

B. Roofs to have minimum 1/4 inch per foot slope.

1.2 WARRANTY

A. Minimum 20 year warranty.

PART 2 - PRODUCTS

2.1 EPDM ROOFING

A. Prefer fully adhered system.

B. Specify white roofing material.

2.2 WALKWAYS

A. Provide walk pads from access point(s) to all equipment.

1. Provide pads not rolls.

END OF SECTION 075323

SECTION 076200 – SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 DESCRIPTION

A. Downspouts are to be connected to storm sewer, where feasible.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 076200

SECTION 077100 – ROOF SPECIALTIES

PART 1 - GENERAL (Not Used)

PART 2 - PRODUCTS

2.1 COPINGS

A. Pre-finished metal with concealed fasteners over EPDM flashing.

END OF SECTION 077100

SECTION 078413 – PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. All floor penetrations are to be sealed with the appropriate firestopping.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 078413

SECTION 081113 – HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Prehung doors are not acceptable.

B. Doors with lites to have narrow lite.

PART 2 - PRODUCTS

2.1 DOORS AND FRAMES

A. Doors:

1. Gauge: Minimum 18 gauge.
2. Edge Construction: Seamless.
3. Exterior Doors: Galvanized.
4. Exterior Door Sidelights: Where exterior doors have adjacent sidelights, provide 8 inch to 10 inch high sills.

B. Frames:

1. Gauge: Minimum 16 gauge.
2. Construction: Full profile welded.
3. Exterior Frames: Galvanized.

END OF SECTION 081113

SECTION 081416 – FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Prehung doors are not acceptable.

B. Doors with lites to have narrow lite.

PART 2 - PRODUCTS

2.1 VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Solid Core Doors: Particleboard core.

B. Veneer Species: Plain sliced oak.

C. Finish: Factory finish stained doors.

END OF SECTION 081416

SECTION 083113 – ACCESS DOORS AND FRAMES

PART 1 - GENERAL (Not Used)

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND FRAMES

A. Material: Aluminum.

2.2 LOCKS

A. Keyed with Best 7 pin cores.

END OF SECTION 083113

SECTION 084113 – ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL (Not Used)

PART 2 - PRODUCTS

2.1 FRAMING

A. Windows must be anodized aluminum with insulating glass compatible with the core building materials. Pre-finished metal frames will be considered on an individual basis.

2.2 ENTRANCE DOOR SYSTEMS

A. Door Design: Medium or wide stile.

B. Sidelights: Provide 8 inch to 10 inch high sills at sidelights adjacent to entrance doors.

END OF SECTION 084113

SECTION 087100 – DOOR HARDWARE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Sole Source Items: SIUE will provide sole source letters.

B. Prefer to allow Key Control to be involved at the very early stages and allow Key Control to number rooms. If A/E chooses to number rooms, always use four digit numbers with the first number being the number of the floor level. (i.e. 0101 in the basement level, 1101 on ground level). Also number in wing style such as 0100 wing, 0200 wing 0300 wing and 0400 wing with numbers in that wing falling within the range indicated. Use all even numbering, that way when renovations take place, there are room numbers available to issue. Avoid using letters after a room number, but it is okay to use on door numbers. Doors that lead between two rooms, but requiring a key to enter should be labeled as the room in which a key is needed to get access.

1. Key Control prefers to receive drawings in electronic format. Preferably in DWG format or PDF with layers so that layers can be turned off as needed. Include the full print, not just new floor plans.

PART 2 - PRODUCTS

2.1 HINGES

A. Provide 4-1/2 by 4-1/2 BB hinges with NRP and 626 finish.

1. No continuous hinges or pivots at entrance doors.

2.2 LOCKS

A. Mortise Locks: Provide at all classrooms.

1. Trim: Similar to Schlage Sparta lever trim.
2. Manufacturers:

    a. Best.
    b. Stanley – 40H Mortise locks.

3. Locks to have cylinders provided by lock manufacturer but compatible with Best removable 7 pin cores. The Contractor shall purchase the cores. Cores are delivered directly from Best combinated per SIUE's Key Control specifications.

    a. Best compatible small format interchangeable cores(SFIC). Hardware supplier to pay for cores indicated in specs. Best will contact SIUE Key

Control for keying info. SIUE Key Control will install final cores after substantial completion. Any temporary construction cores will be supplied by contractor performing work.

4. Labs and other secured spaces should be provided with office lock only.

    a. Manufacturer:

        1) Schlage; CO-200, battery operated series cylindrical, stand alone off-line lock proximity reader.

5. Computer classrooms and computer labs should be lockable when not in use.

2.3 KEYING

A. Master and Grand Master: Coordinate with SIUE Key Control.

B. Key Lock Box (Knox Box): None required.

2.4 ELECTRIC STRIKES

A. Products:

1. Hess 9600.
2. Hess 1006CS.

2.5 EXIT DEVICES

A. Provide rim devices. BHMA A156.3, Grade 1, UL Listed, meeting NFPA 80 and NFPA 101.

1. Not to have vertical rods, either surface or concealed.
2. On double doors, provide keyed removable mullion.

B. No electric retracting exit devices.

C. Manufacturers:

1. Von Duprin; 33 or 99 series with breakaway lever trim.
2. No Corbin Russwin.

2.6 AUTOMATIC DOOR OPERATORS

A. All door operators to have push pads inside and outside of opening including each door in a series.

1. Avoid exterior bollards where possible.
2. Avoid sliding door operators.

B. Product:

1. Besam; SW200i.

2.7 CARD READERS

A. Two entry doors per building to be provided with card readers integrated with door operators on the accessible route into the building. Coordinate installation with SIUE Information and Technology Services.

2.8 CLOSERS

A. No floor closers.

B. Product: BHMA A156.4, rack-and-pinion hydraulic type, with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm.

1. LCN; 4040XP with cushion arm.

2.9 ELECTROMAGNETIC HOLDERS

A. To be independent of door closer (not integrated into hold-open).

2.10 DOOR PULLS

A. Provide with door plate at pull.

2.11 RAINGUARDS

A. Provide at exterior hollow metal doors.

2.12 THRESHOLDS

A. Prefer aluminum thresholds.

2.13 SWEEPS

A. Prefer thick neoprene.

2.14 AUTOMATIC DOOR BOTTOMS

A. Only acceptable where needed for sound control.

2.15 PROTECTION PLATES

A. Provide stainless steel kick plates at heavy abuse doors. 36” high x 2” less of door width per side.

B. Provide stainless steel half plates at custodial doors. 18” high x 2’ less of door width per side.

END OF SECTION 087100

SECTION 087100 – DOOR HARDWARE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Sole Source Items: SIUE will provide sole source letters.

B. Prefer to allow Key Control to be involved at the very early stages and allow Key Control to number rooms. If A/E chooses to number rooms, always use four digit numbers with the first number being the number of the floor level. (i.e. 0101 in the basement level, 1101 on ground level). Also number in wing style such as 0100 wing, 0200 wing 0300 wing and 0400 wing with numbers in that wing falling within the range indicated. Use all even numbering, that way when renovations take place, there are room numbers available to issue. Avoid using letters after a room number, but it is okay to use on door numbers. Doors that lead between two rooms, but requiring a key to enter should be labeled as the room in which a key is needed to get access.

1. Key Control prefers to receive drawings in electronic format. Preferably in DWG format or PDF with layers so that layers can be turned off as needed. Include the full print, not just new floor plans.

PART 2 - PRODUCTS

2.1 HINGES

A. Provide 4-1/2 by 4-1/2 BB hinges with NRP and 626 finish.

1. No continuous hinges or pivots at entrance doors.

2.2 LOCKS

A. Mortise Locks: Provide at all classrooms.

1. Trim: Similar to Schlage Sparta lever trim.
2. Manufacturers:

    a. Best.
    b. Stanley – 40H Mortise locks.

3. Locks to have cylinders provided by lock manufacturer but compatible with Best removable 7 pin cores. The Contractor shall purchase the cores. Cores are delivered directly from Best combinated per SIUE's Key Control specifications.

    a. Best compatible small format interchangeable cores (SFIC). Hardware supplier to pay for cores indicated in specs. Best will contact SIUE Key

Control for keying info. SIUE Key Control will install final cores after substantial completion. Any temporary construction cores will be supplied by contractor performing work.

4. Labs and other secured spaces should be provided with office lock only.

   a. Manufacturer:

      1) Schlage; CO-200, battery operated series cylindrical, stand alone off-line lock proximity reader.

5. Computer classrooms and computer labs should be lockable when not in use.

2.3 KEYING

A. Master and Grand Master: Coordinate with SIUE Key Control.

B. Key Lock Box (Knox Box): None required.

2.4 ELECTRIC STRIKES

A. Products:

1. Hess 9600.
2. Hess 1006CS.

2.5 EXIT DEVICES

A. Provide rim devices. BHMA A156.3, Grade 1, UL Listed, meeting NFPA 80 and NFPA 101.

1. Not to have vertical rods, either surface or concealed.
2. On double doors, provide keyed removable mullion.

B. No electric retracting exit devices.

C. Manufacturers:

1. Von Duprin; 33 or 99 series with breakaway lever trim.
2. No Corbin Russwin.

2.6 AUTOMATIC DOOR OPERATORS

A. All door operators to have push pads inside and outside of opening including each door in a series.

1. Avoid exterior bollards where possible.
2. Avoid sliding door operators.

B. Product:

1. LCN 4600 series.

2.7 CARD READERS

A. Two entry doors per building to be provided with card readers integrated with door operators on the accessible route into the building. Coordinate installation with SIUE Information and Technology Services.

2.8 CLOSERS

A. No floor closers.

B. Product: BHMA A156.4, rack-and-pinion hydraulic type, with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm.

1. LCN; 4040XP with cushion arm.

2.9 ELECTROMAGNETIC HOLDERS

A. To be independent of door closer (not integrated into hold-open).

2.10 DOOR PULLS

A. Provide with door plate at pull.

2.11 RAINGUARDS

A. Provide at exterior hollow metal doors.

2.12 THRESHOLDS

A. Prefer aluminum thresholds.

2.13 SWEEPS

A. Prefer thick neoprene.

2.14 AUTOMATIC DOOR BOTTOMS

A. Only acceptable where needed for sound control.

2.15 PROTECTION PLATES

A. Provide stainless steel kick plates at heavy abuse doors. 36” high x 2” less of door width per side.

B. Provide stainless steel half plates at custodial doors. 18” high x 2’ less of door width per side.

END OF SECTION 087100

SECTION 088000 – GLAZING

PART 1 - GENERAL (Not Used)

PART 2 - PRODUCTS

2.1 GENERAL

A. Meet code requirements for glass types in doors, rated opening, etc.

B. Glass shall be energy-efficient and incorporate UV protection.

C. Reflective or tinted glazing will be judged in conjunction with the building design and concept.

2.2 GLASS PRODUCTS

A. Monolithic Float Glass: Annealed or Kind HS float glass where heat strengthening is required to resist thermal stresses induced by differential shading of individual glass lites and to comply with system performance.

1. Thickness: 6.0 mm.
2. Use Kind FT for door lites and borrow lites adjacent to doors.

B. Annealed Float Glass: ASTM C 1036, Type I, Quality-Q3, of class indicated.

1. Ultraclear (Low-Iron) Float Glass for Display Glazing: Class I (clear); with visible light transmission of not less than 91 percent and solar heat gain coefficient of not less than 0.87.

a. Provide products by one of the following:

1) AGC Industries Inc.; Clear Vision.
2) Guardian Industries; Ultra White.
3) Pilkington; Optiwhite.
4) PPG Industries, Inc.; Starphire.

C. Tinted Annealed Float Glass: ASTM C 1036, Type I, Class 2 (tinted), Quality-Q3.

1. Tint color varies throughout campus.

D. Heat-Strengthened Float Glass: ASTM C 1048, Type I, Quality-Q3; of class, kind, and condition indicated.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2. Provide Kind HS (heat-strengthened) float glass in place of annealed float glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements.
3. For uncoated glass, comply with requirements for Condition A.
4. For coated vision glass, comply with requirements for Condition C (other uncoated glass).
5. Provide Kind FT (fully tempered) float glass in place of annealed or Kind HS float glass where safety glass is indicated or required.

E. Ceramic-Coated Vision Glass: Float glass with ceramic enamel applied by silk-screened process and complying with ASTM C 1048, Condition C, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3; and complying with Specification No. 95-1-31 in GANA's "Engineering Standards Manual."

F. Ceramic-Coated Spandrel Glass: ASTM C 1048, Type I, Condition B, Quality-Q3.

1. Fallout Resistance: Provide spandrel units identical to those passing the fallout-resistance test for spandrel glass specified in ASTM C 1048.
2. Provide Kind HS or Kind FT where required by authorities having jurisdiction.
3. Thickness: 6.0 mm.
4. Ceramic Coating Color: Warm gray.
5. Coating Location: Second surface.

G. Sputter-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide or –nitride coating deposited by vacuum deposition process after manufacture and heat treatment (if any).

H. Laminated Glass: ASTM C 1172. Obscure laminated glass: Interior vertical application.

1. Construction: Laminate glass with polyvinyl butyral interlayer with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
2. Interlayer Thickness: Provide 0.030 inch thickness, but not less than required to comply as a Type II safety glass material where Kind FT would otherwise be required.
3. Interlayer Color: Clear, medium frosted.

I. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.

1. Provide Kind HS float glass in place of annealed where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements.
2. Sealing System: Dual seal.
3. Spacer: Manufacturer's standard spacer material and construction.
4. Solar Control Low-E Insulating-Glass Units:

    a. Thickness of each Lite: 6.0 mm.
    b. Interspace Content: Air.
    c. Airspace: 12 mm.

d. Outdoor Lite: Kind HS unless required to be Kind FT.
e. Indoor Lite: Class 1 float glass, Kind HS unless required to be Kind FT.
f. Low-E Coating: Sputtered on second surface.
g. Visible Light Transmittance: 35 percent minimum.
h. Ultra-Violet Transmittance: 8 percent.
i. Outdoor Visible Reflectance: 7 percent maximum.
j. Winter Nighttime U-Factor: 0.29 maximum.
k. Summer Daytime U-Factor: 0.28 maximum.
l. Solar Heat Gain Coefficient: 0.29 maximum.
m. Shading Coefficient: 0.22 maximum.

5. Ceramic Coated Spandrel Insulated-Glass Units: Shall meet same requirements as for monolithic spandrel glass except with coating on fourth surface.

J. Mirror Glass: ASTM C 1503; manufactured using copper-free, low-lead mirror coating process.

1. Thickness: 6.0 mm.
2. Edges: Flat polished after fabrication.

END OF SECTION 088000

SECTION 092216 – NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL (Not Used)

PART 2 - PRODUCTS

2.1 NON-STRUCTURAL METAL FRAMING

A. Gauge: Minimum 20 gauge.

B. Provide interior partitions with acoustic batts up to structure or acoustic batts on top of ceilings to improve acoustic control in classrooms, offices, conference rooms and around mechanical/electric rooms.

END OF SECTION 092216

SECTION 092900 – GYPSUM BOARD

PART 1 - GENERAL

1.1 DESCRIPTION

A. Limit use of Level 5 finish to where needed due to harsh lighting conditions (natural or electric).

PART 2 - PRODUCTS

A. Gypsum Board: Provide 5/8 inch thick, 1/2 inch thick may be used under special circumstances approved by SIUE.

B. Tile Backer Panels: Provide cementicious board.

C. Moisture/Mold Resistance: Provide in wet areas, such as restrooms.

END OF SECTION 092900

SECTION 093013 – CERAMIC TILING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide ceramic tile for all walls in restrooms.

1.2 MAINTENANCE MATERIAL

A. Furnish extra materials, from the same product run.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 2 percent of amount installed.
2. Grout: Furnish quantity of grout equal to 2 percent of amount installed.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 093013

Revised 09.13.2019

SECTION 095113 – ACOUSTICAL PANEL CEILING

PART 1 - GENERAL

1.1 MAINTENANCE MATERIAL

A. Furnish extra materials.

1. Acoustical Ceiling Units: Full-size panels equal to 2 percent of quantity installed.

PART 2 - PRODUCTS

2.1 ACOUSTICAL PANELS

A. Acoustical panels not to exceed 2 feet in any dimension. 2 feet by 2 feet by ¾ inch thick panels are required. Basis of design is Armstrong Mesa Angled Tegular

B. Edge Detail: Angled Tegular.

C. NCR: 0.70 or higher as project specific requirements may demand.

2.2 METAL SUSPENSION SYSTEM

A. Specify fine line 9/16 inch grid. White.

END OF SECTION 095113

SECTION 096513 – RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 MAINTENANCE MATERIAL

A. Furnish extra materials.

1. Resilient Base: Furnish not less than 2 percent of amount installed, in same form as material installed.

PART 2 - PRODUCTS

2.1 VINYL BASE

A. Vinyl cove base is the preferred wall base material except for in specified areas where epoxy flooring material, tile material, or certain specialty flooring materials (ie: School of Dental Medicine) are used.

END OF SECTION 096513

SECTION 096516 – RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.1 MAINTENANCE MATERIAL

A. Furnish extra materials.

1. Resilient Sheet Flooring: Furnish not less than 2 percent of amount installed, in roll form and in full roll width.

PART 2 - PRODUCTS

2.1 RUBBER FLOORING

A. Rubber flooring does not clean well. Use only upon project specific SIUE approval.

2.2 LINOLEUM SHEET FLOORING

A. Use for Laboratory classrooms.

B. Products:

1. Armstrong World Industries, Inc.; Linorette and Granette.
2. Johnsonite / Tarkett Inc.; Linoleum XF.
3. Forbo Flooring, Inc.; Marmoleum Vivace.

C. Thickness: 0.10 inch.

D. Seaming Method: Heat welded.

E. Integral-Flash-Cove-Base: 6 inches high.

1. Cove Strip: 1-inch radius.
2. Cove-Base Cap Strip: Square metal, vinyl, or rubber cap.

F. Floor Polish.

END OF SECTION 096516

SECTION 096723 – RESINOUS FLOORING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide resinous flooring with integral base at all restrooms and shower rooms.

B. Provide minimum amount of grit in topcoat to meet slip resistance requirements. Too much grit makes floors very difficult to clean.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 096723

SECTION 096813 – TILE CARPETING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Use tile carpeting for:

1. Offices.
2. Conference rooms.
3. Other locations only where needed and approved by SIUE.

1.2 MAINTENANCE MATERIAL

A. Furnish extra materials, from the same product run.

1. Carpet Tile: Full-size units equal to 2 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

PART 2 - PRODUCTS

2.1 MATERIALS

A. Adhere to Illinois Public Higher Education Cooperative (IPHEC) contract where possible.

B. Recycle all demolished and scrap carpet.

END OF SECTION 096813

SECTION 097200 – WALL COVERINGS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Wall coverings may only be used upon project specific SIUE approval.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 097200

SECTION 099113 – EXTERIOR PAINTING

PART 1 - GENERAL

1.1 DESCRIPTION

A. SIUE has a purchasing agreement with Sherwin Williams.

1. The local Sherwin Williams manufacturer representative will provide support for specifications and selection of coating systems for all substrates at no cost to the consultant.
2. Contractors bidding work for SIUE are to contact the local Sherwin Williams store to receive negotiated pricing on paint and related products. Identify all projects by Project Name and Project Number when purchasing or receiving quotations for products.

B. All paints water based, including epoxy.

C. Comply with EPS, LEED, and State of Illinois VOC requirements.

D. There is no need for anti-graffiti protection.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All paint products to be Sherwin Williams. SIUE to provide single source letter.

B. Standard Paint for Metal: DTM (Direct to Metal)

1. Metal door frames.
2. Handrails.
3. Bollards.

END OF SECTION 099113

SECTION 099123 – INTERIOR PAINTING

PART 1 - GENERAL

1.1 DESCRIPTION

A. SIUE has a purchasing agreement with Sherwin Williams.

1. The local Sherwin Williams manufacturer representative will provide support for specifications and selection of coating systems for all substrates at no cost to the consultant.
2. Contractors bidding work for SIUE are to contact the local Sherwin Williams store to receive negotiated pricing on paint and related products. Identify all projects by Project Name and Project Number when purchasing or receiving quotations for products.

B. All paints water based, including epoxy.

C. Comply with EPS, LEED, and State of Illinois VOC requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All interior paint products to be Sherwin Williams. SIUE to provide single source letter.

B. Standard Interior Paint: Sherwin Williams Promar 200.

1. Standard Color: Dover White SW6385.
2. Standard Sheen:

    a. Hallways and Classrooms: Semi-gloss.
    b. Offices: Eggshell.

C. Standard Paint for Metal: DMT

1. Metal door frames.
2. Handrails.
3. Bollards.

END OF SECTION 099123

SECTION 099419 – MULTICOLOR INTERIOR FINISHING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Multicolored or Zolotone type paints are not to be used.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 099419

SECTION 101100 – VISUAL DISPLAY UNITS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide white boards in all classrooms.

B. Chalk boards may be used on a project basis. Confirm with SIUE PM.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 101100

SECTION 101400 – SIGNAGE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Interior Way Finding Signage:

1. Comply with SIUE Interior Signage Master Plan with Signage Addendum 1 and Addendum 2. Confirm room number with SIUE PM and / or Key Control.

B. Exterior Signage:

1. Comply with SIUE Exterior Signage Elevation Drawing.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 101100

SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE

Interior Signage Master Plan

Date: 6/22/2012

This Interor Signage Master Plan is being implemented for the standardization of signage throughout the SIUE campus. The goal of this Master Plan is to create a uniform design system that can be recognized throughout the campus. Signage standards will improve student experience by creating a cohesive and functional visual experience while reducing confusion.

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Introduction

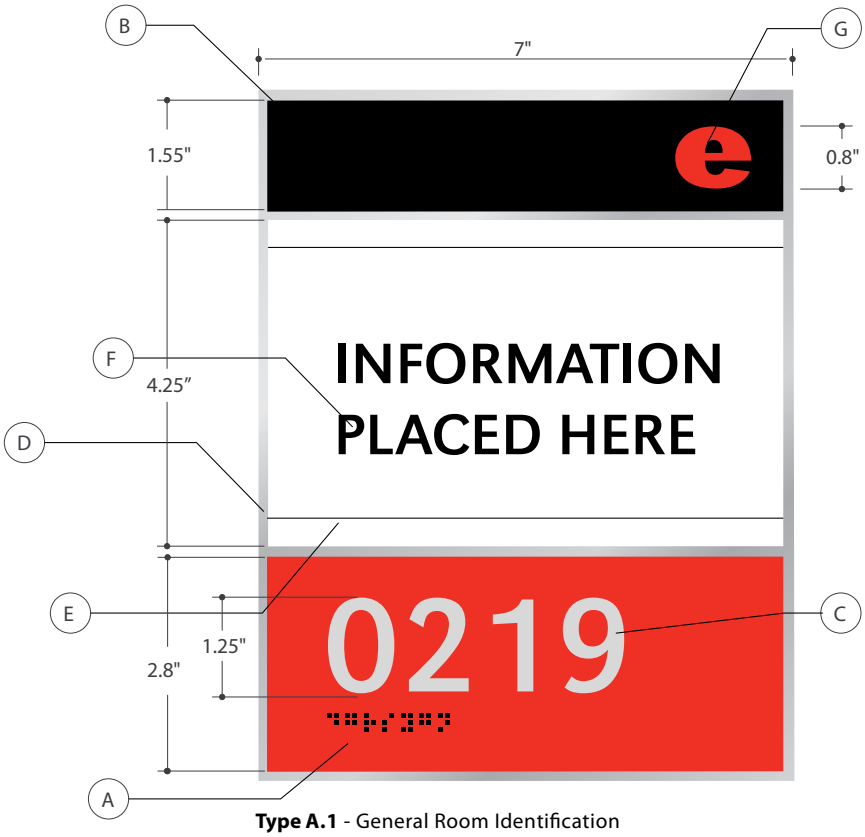
Southern Illinois University understands the importance of standardizing the interior signage throughout the campus as it is directly related to student experience. Effective wayfinding relies on signage design that has considered visibility and location.

The goals of this Master Plan include:

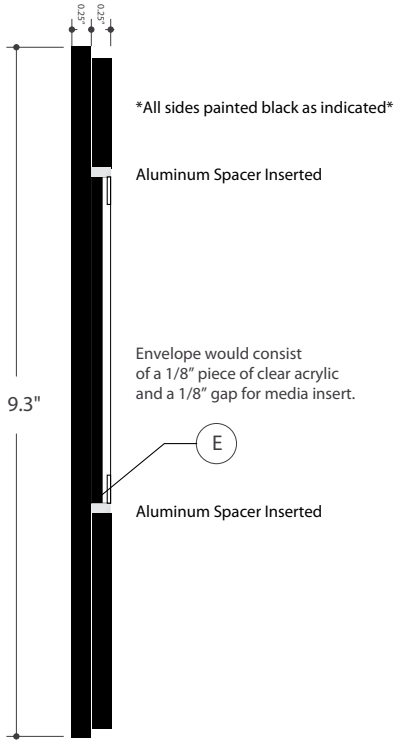
* Create a uniform design system that is recognized by students, faculty, and visitors.

* Provide a guideline for the future implementation of signage on the campus.

The following document addresses the widely used signage throughtout the campus. On the occasion that signage is needed that does not fit into one of the categories, this guide is to be used as a framework for the development of additional signage. Changes and modifications to these standards are to be reviewed by Facilities Management.



Type A.1 - General Room Identification
7"w X 9.3"h



SIDE VIEW

Face Finish
A High Pressure Laminate PMS 485
Abet 823SEI Rosso Tango

Face Finish
B High Pressure Laminate BLACK

Raised Copy
C Brushed Aluminum
Font URW Grotesk

Metal Backer
D High Pressure Laminate:
Brushed Aluminum

Media
E Clear Acrylic Envelope

Insert
F Media: White Paper;
Font: URW Grotesk;
Graphics/Copy Color: Black

Logo
G Raised Photopolymer
Color: Red PMS 485

A1

Date: 6/22/2012

Type A.2 - Oversized Room Identification
11.5"w X 14.5"h

Face Finish
A High Pressure Laminate PMS 485
Abet 823SEI Rosso Tango

Face Finish
B High Pressure Laminate BLACK

Raised Copy
C Brushed Aluminum
Font URW Grotesk

Metal Backer
D High Pressure Laminate:
Brushed Aluminum

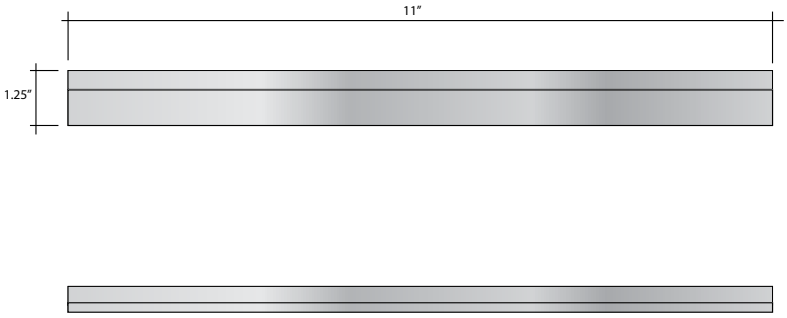
Media
E Clear Acrylic Envelope-
to fit 8.5" x 11" sheet of paper

Insert
F Media: White Paper;
Font: URW Grotesk;
Graphics/Copy Color: Black

Logo
G Raised Photopolymer
Color: Red PMS 485

A2

Date: 6/22/2012



Type A.3 - 11" Aluminum Paper Clip
11"w x 8.5" t

***Suggested item for class schedules when a larger Room Identification sign can not be installed.

A3.1

Type A.3.2 - Clear envelope with updatable plastic sleeve
11"x 9.25"

A3.2

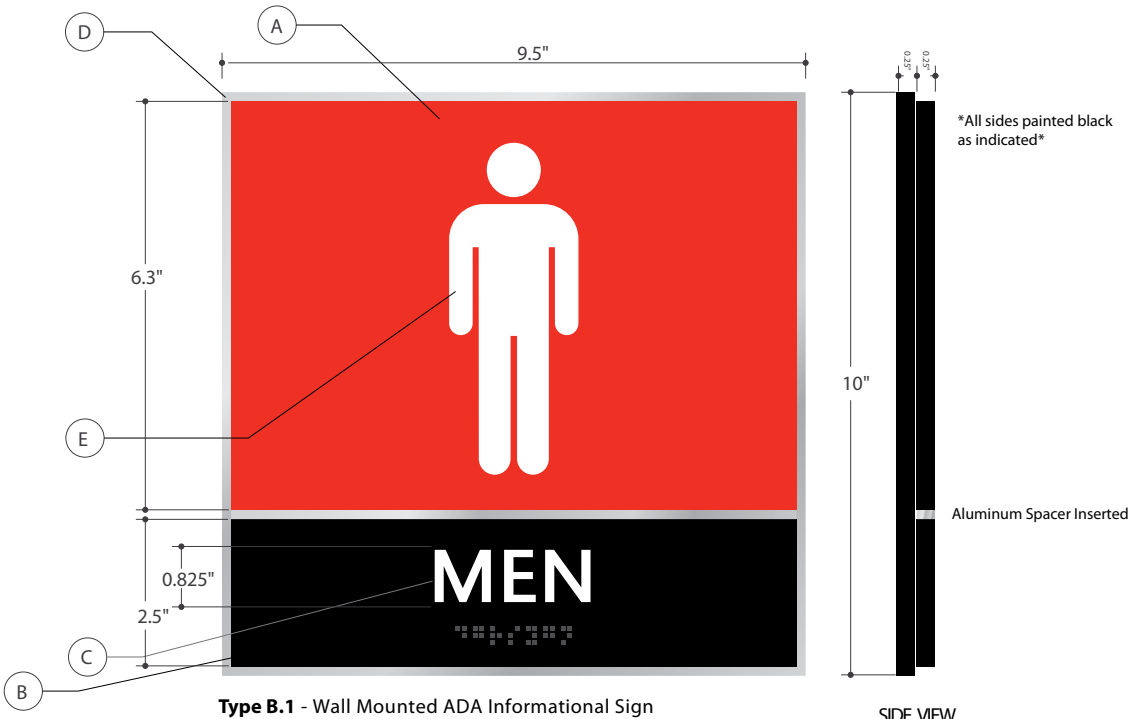
A 11"w Note Bar Holder
WALL MOUNTED or DOOR MOUNTED directly under A2 sign

B High Pressure Laminate PMS 485
Abet 823SEI Rosso Tango

C .125 Acrylic BLACK

D .08 Acrylic - Non-Glare

Date: 6/22/2012



Type B.1 - Wall Mounted ADA Informational Sign
9.5"w X 10"h

Face Finish
A High Pressure Laminate PMS 485 Abet 823SEI Rosso Tango

Face Finish
B High Pressure Laminate BLACK

Raised Copy
C Raised White Font URWGrotesk

Metal Backer
D High Pressure Laminate Brushed Aluminum

ADA Symbol
E Raised white ADA symbol

B1

Date: 6/22/2012

Type B.2 - Wall Mounted ADA Informational Sign
9.5"w X 10"h

Face Finish
A High Pressure Laminate PMS 485
Abet 823SEI Rosso Tango

Face Finish
B High Pressure Laminate BLACK

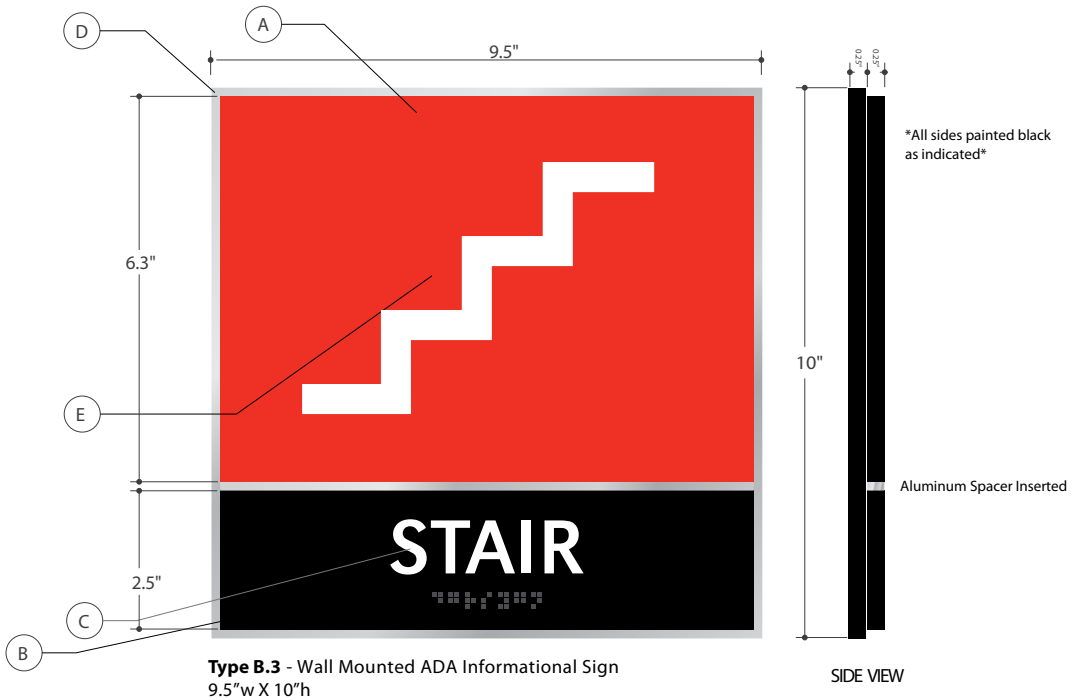
Raised Copy
C Raised White
Font URW Grotesk

Metal Backer
D High Pressure Laminate
Brushed Aluminum

ADA Symbol
E Raised white ADA symbol

B2

Date: 6/22/2012



Type B.3 - Wall Mounted ADA Informational Sign
9.5"w X 10"h

Face Finish
A High Pressure Laminate PMS 485 Abet 823SEI Rosso Tango

Face Finish
B High Pressure Laminate BLACK

Raised Copy
C Raised White Font URWGrotesk

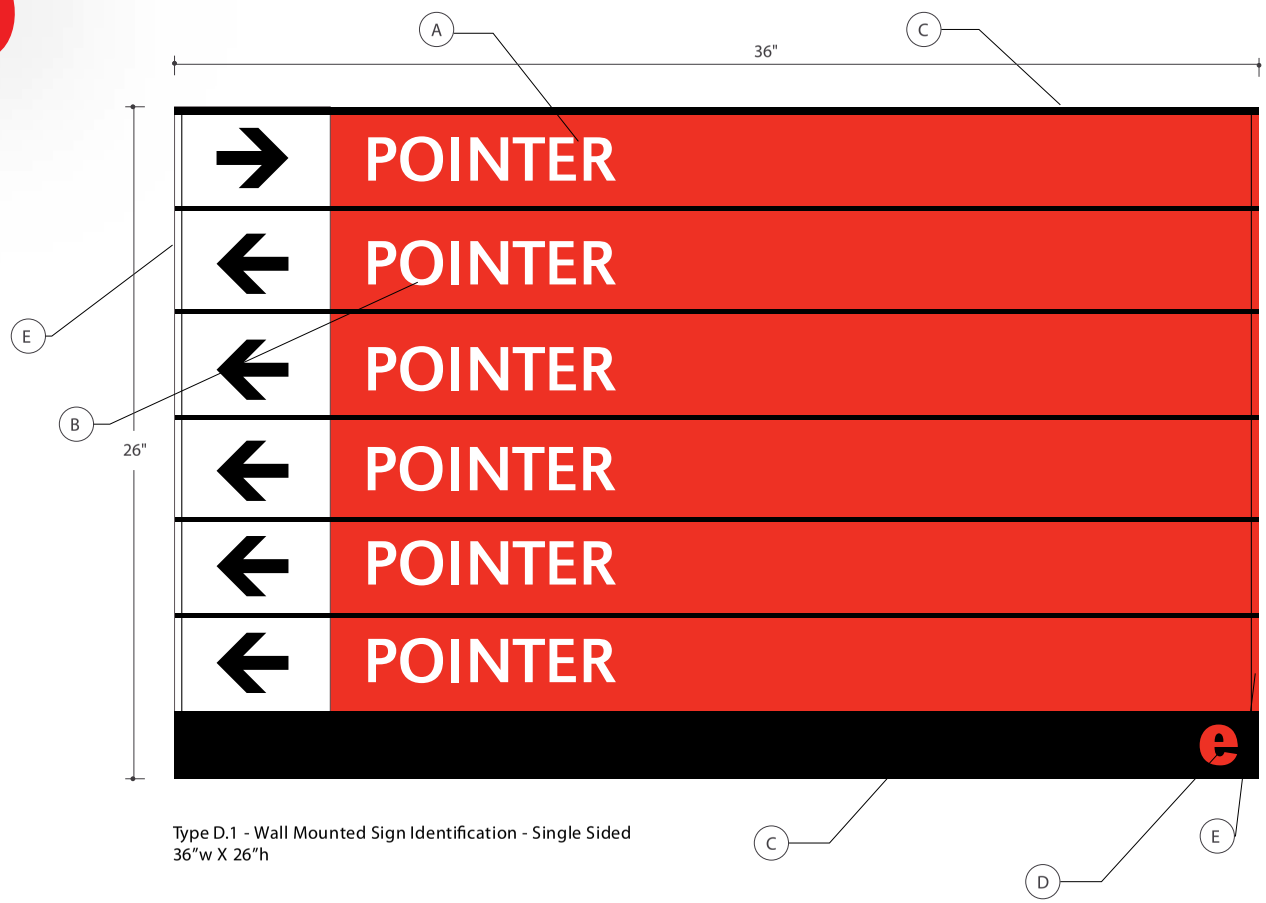
Metal Backer
D High Pressure Laminate Brushed Aluminum

ADA Symbol
E Raised white ADA symbol

1.B3.001

B3

Date: 6/22/2012



Type D.1 - Wall Mounted Sign Identification - Single Sided
36"w X 26"h

Substrate
A 1/4" Hardboard w/ REMOVABLE PAPER INSERTS FOR FUTURE UPDATES -clear acrylic cover for inserts

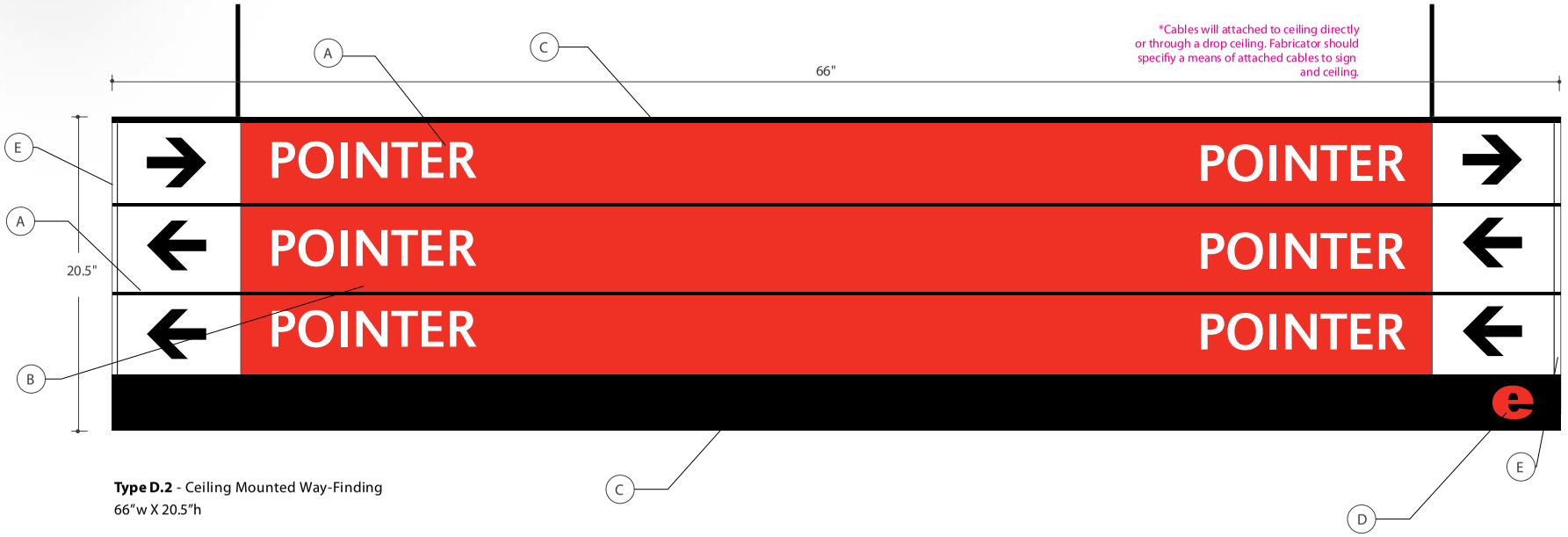
Paper Insert Copy
B WHITE Font URW Grotesk on Red PMS 485 Background

Black Strips
C High Pressure Laminate BLACK

Edge Strips
E 1/2" clear plastic edge clips

Logo
D Raised Photopolymer or routed acrylic backpainted Color: Red PMS 485

D1
Date: 6/22/2012



Type D.2 - Ceiling Mounted Way-Finding
66"w X 20.5"h

ALL SIGNS ARE DOUBLE SIDED
Note: If necessary due to space constraints, 'Bathroom' and 'Elevator' Information can be included on the same line.

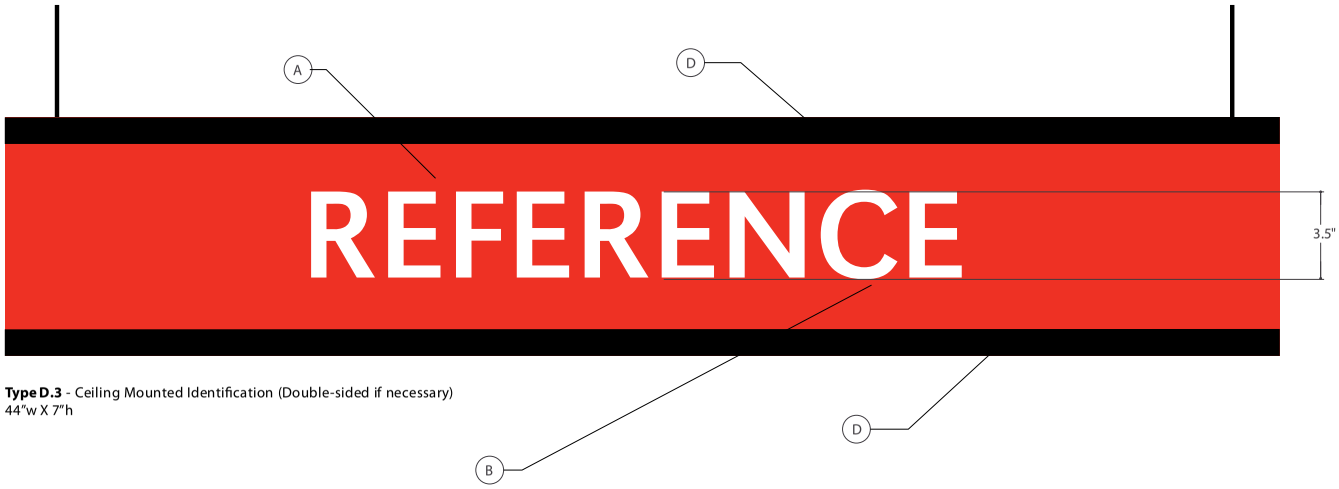
A — 1/4" Hardboard w/ REMOVABLE PAPER INSERTS FOR FUTURE UPDATES -clear acrylic cover for inserts

Paper Insert Copy
B — WHITE Font URW Grotesk on Red PMS 485 Background

Black Strips
C — High Pressure Laminate BLACK

Logo
D — Raised Photopolymer or routed acrylic backpainted Color: Red PMS 485

Edge Strips
E — 1/2" clear plastic edge clips

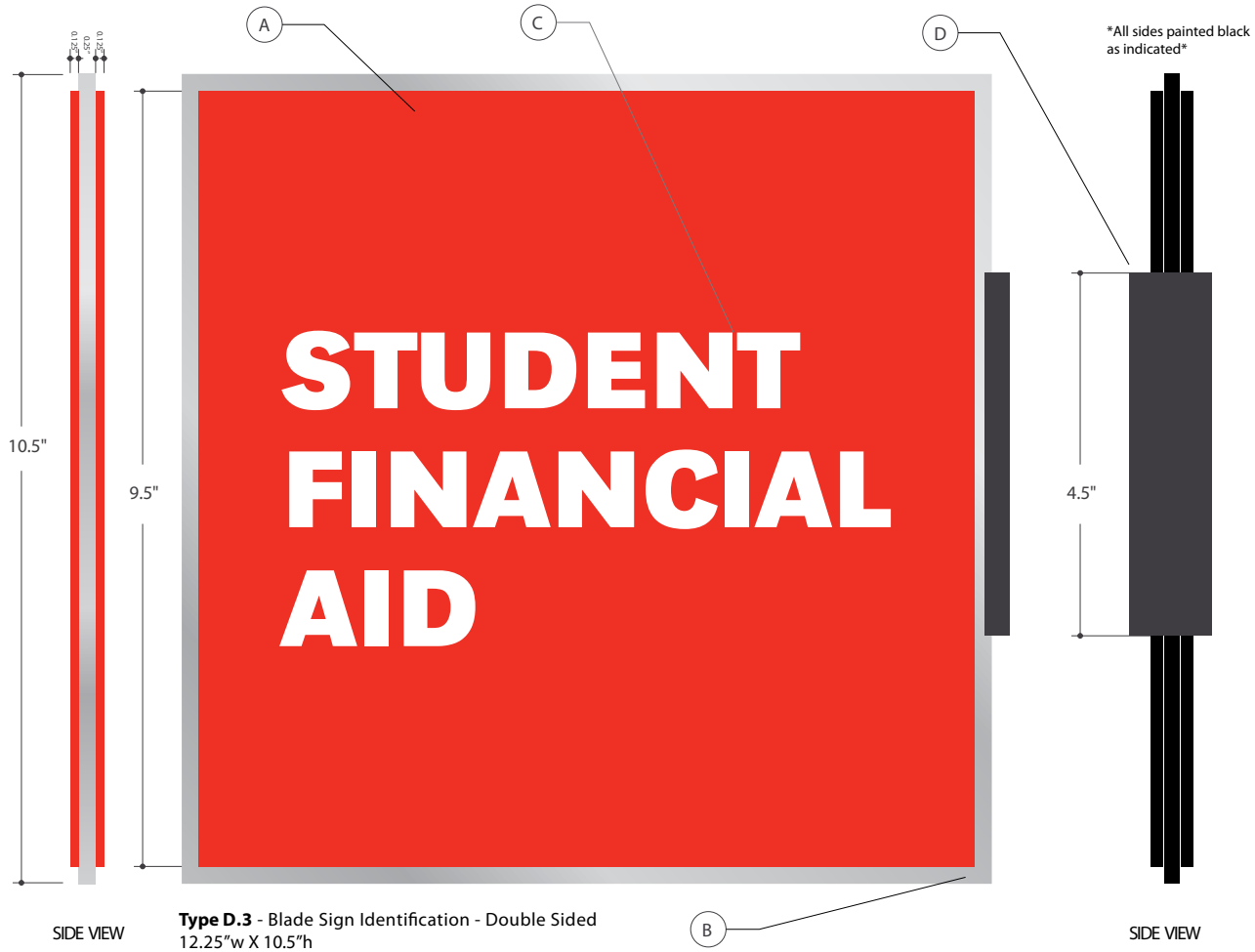


Type D.3 - Ceiling Mounted Identification (Double-sided if necessary)
44"w X 7"h

A 1/4" Hardboard w/
REMOVABLE PAPER
INSERTS FOR
FUTURE UPDATES
-clear acrylic cover for inserts

Text
B WHITE
Font URW Grotesk

Black Strips
C High Pressure Laminate - BLACK



Type D.3 - Blade Sign Identification - Double Sided
12.25"w X 10.5"h

ALL BLADE SIGNS ARE DOUBLE SIDED

Face Finish
A High Pressure Laminate PMS 485 Abet 823SEI Rosso Tango

Vinyl Copy
C WHITE Font URW Grotesk

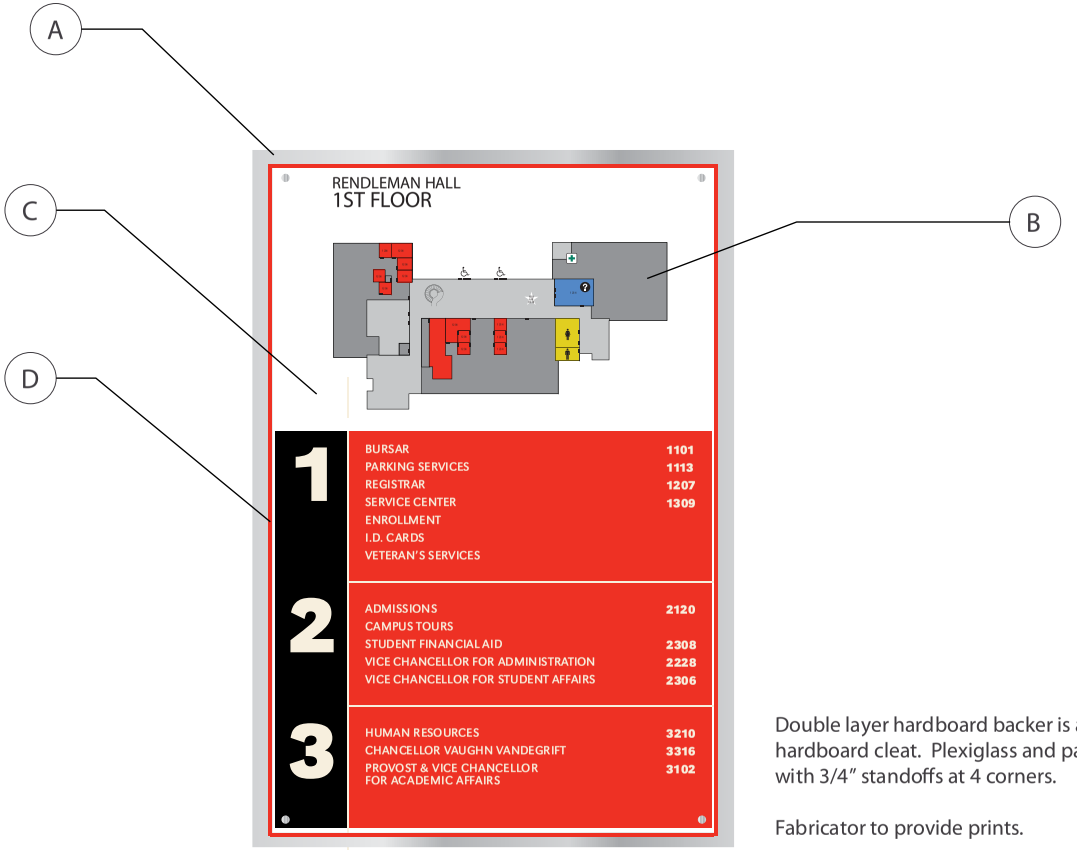
ADA Symbol
E White Vinyl ADA symbol when necessary

Metal Core
B High Pressure Laminate Brushed Aluminum

Mount
D flat mounting wall plate

D3

Date: 6/22/2012



Type D.4 - Building Directory & Map
24"w X 38"h x 1.2" d

Double layer hardboard backer is attached to wall with a hardboard cleat. Plexiglass and paper insert held on with 3/4" standoffs at 4 corners.

Fabricator to provide prints.

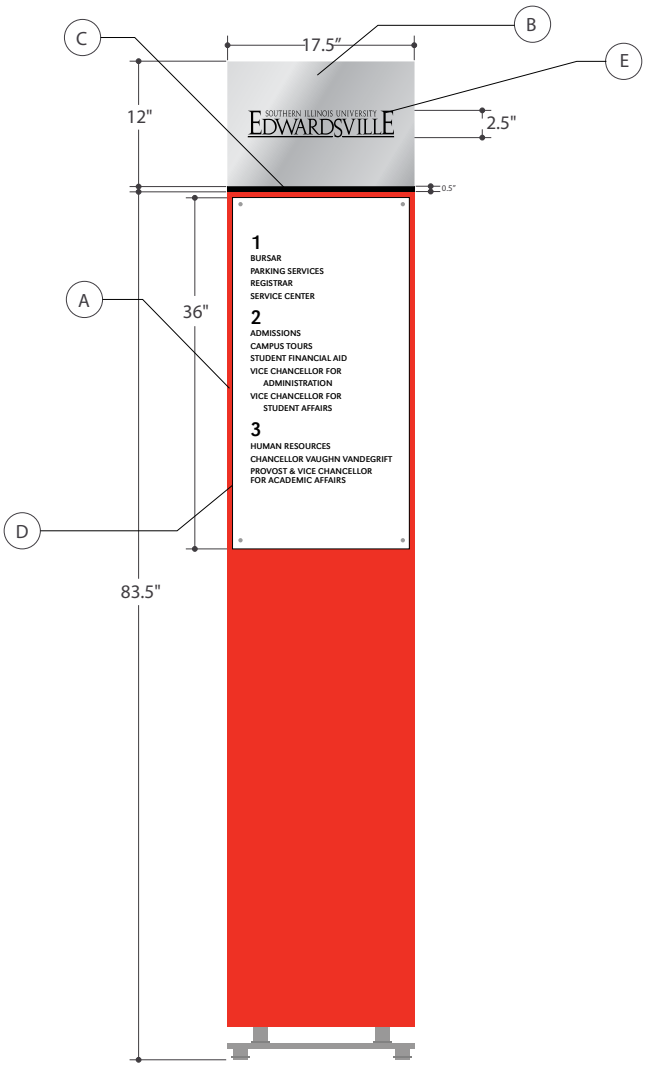
D4

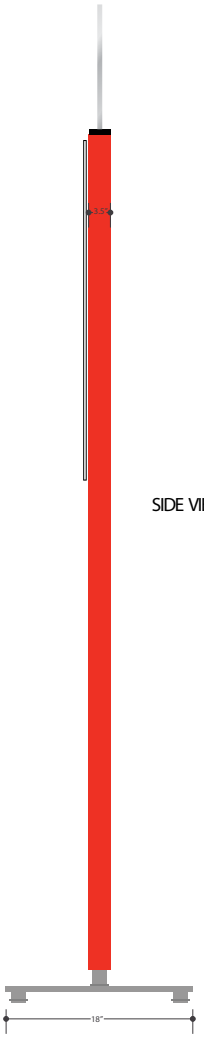
Face Finish
(A) High Pressure Laminate Brushed Aluminum

Face Finish
(B) Clear Plexi Glass

Media
(C) Color Building Directory Print

Secondary Face Finish
(D) High Pressure Laminate PMS 485 Abet 823SEI Rosso Tango





SIDE VIEW

18" x 18" aluminum base with a 1/4" rolled steel plate inside for support. Paper insert under plexiglass for future changes. Plexiglass and paper insert held on with 3/4" standoffs at 4 corners. Text shown is for representation only.

Face Finish
(A) High Pressure Laminate PMS 485 Abet 823SEI Rosso Tango

Face Finish
(B) High Pressure Laminate Brushed Aluminum

Reveal
(C) Black Acrylic

(D) Paper Insert under plexiglass with URW Grotesk Bold

Logo
(E) Laser Cut laminate flush-mounted to surface

D5

Date: 6/22/2012

*All sides painted black
as indicated*

Type E.1 - Stairwell Evacuation Signage
12"w X 12.75"h

Face Finish
A High Pressure Laminate PMS 485
Abet 823SEI Rosso Tango

Raised Copy
B Black
Font URW Grotesk

Metal Backer
C High Pressure Laminate
Brushed Aluminum

Raised Copy
D White
Font URW Grotesk

E1

Date: 6/22/2012

Type V.1 - Interior Vinyl - Secondary Office Identification Signage
Various - Text Height Approx. 3.5”

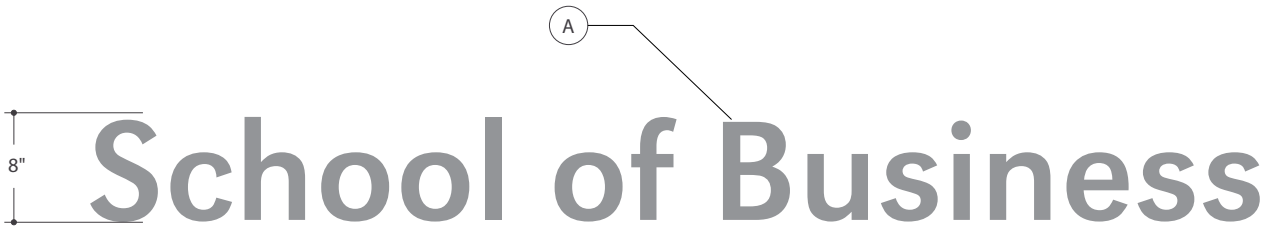
Typeface should be the SIUE approved font “SLIMBACH” - Minion Pro is shown and should not be used on final artwork.

Vinyl

A Frosted Vinyl

V1

Date: 6/22/2012



Type V.2 - Metal Letters for School Identification
8”t text

FONT: GROTESK REGULAR

Face Finish

A .2” Thick Brushed-Alumnium Letters flush-mounted to wall

V2

Date: 6/22/2012

Type V.1 - Interior Vinyl - Peck Hall Wing Designation
Various - Text Height Approx. 5”

Typeface should be URW Grotesk Bold

Vinyl

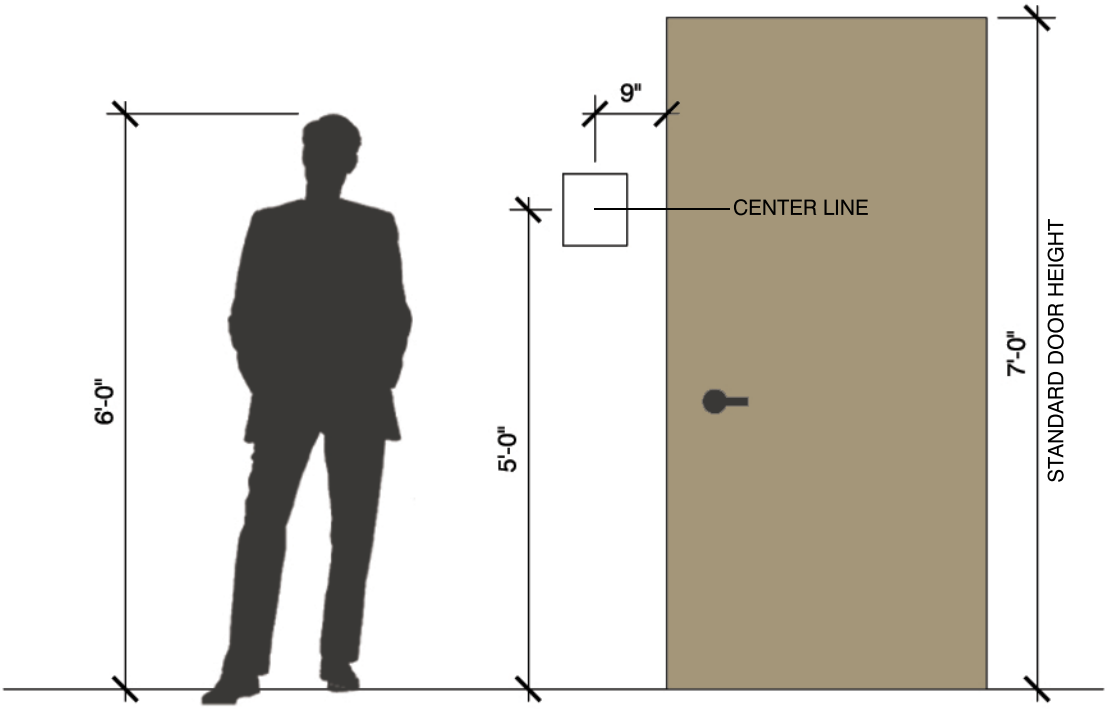
A White Vinyl

V3

Date: 6/22/2012

INSTALLATION SAMPLES

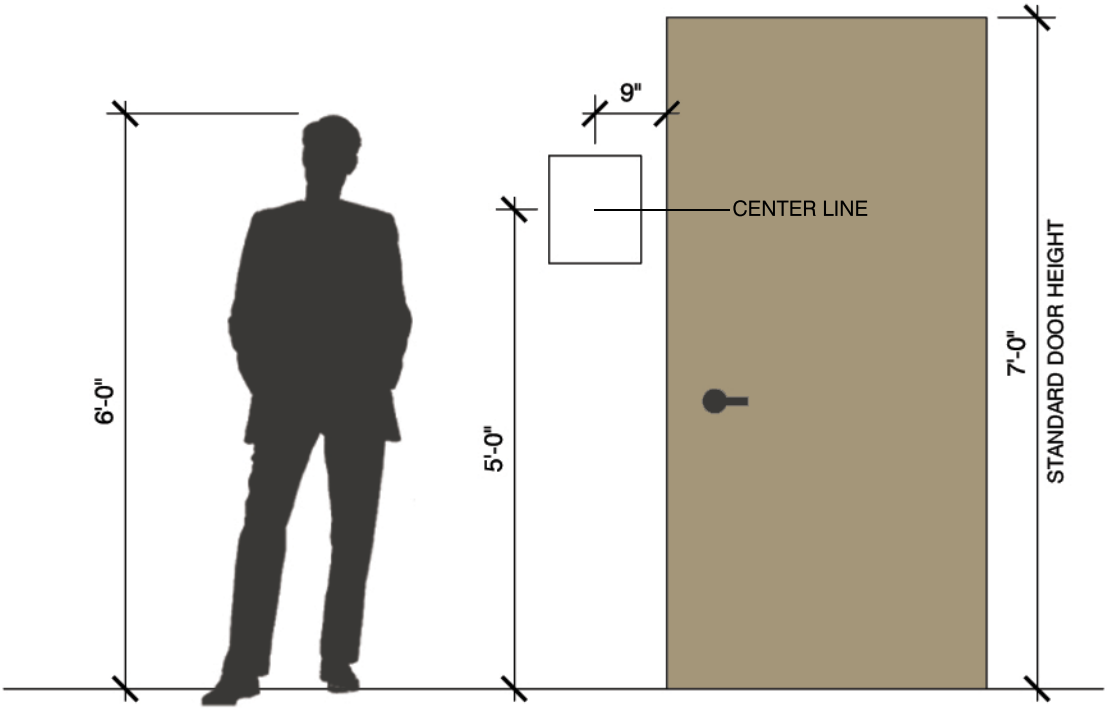
SIGN TYPE A1



Date: 6/22/2012

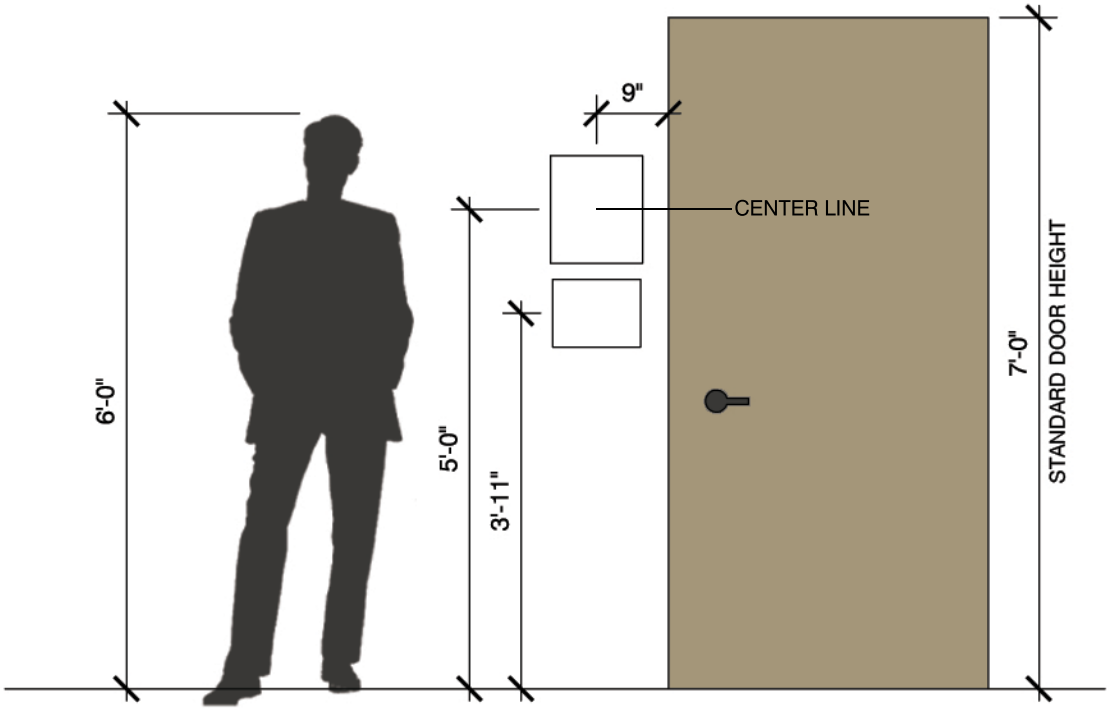
INSTALLATION SAMPLES

SIGN TYPE A2



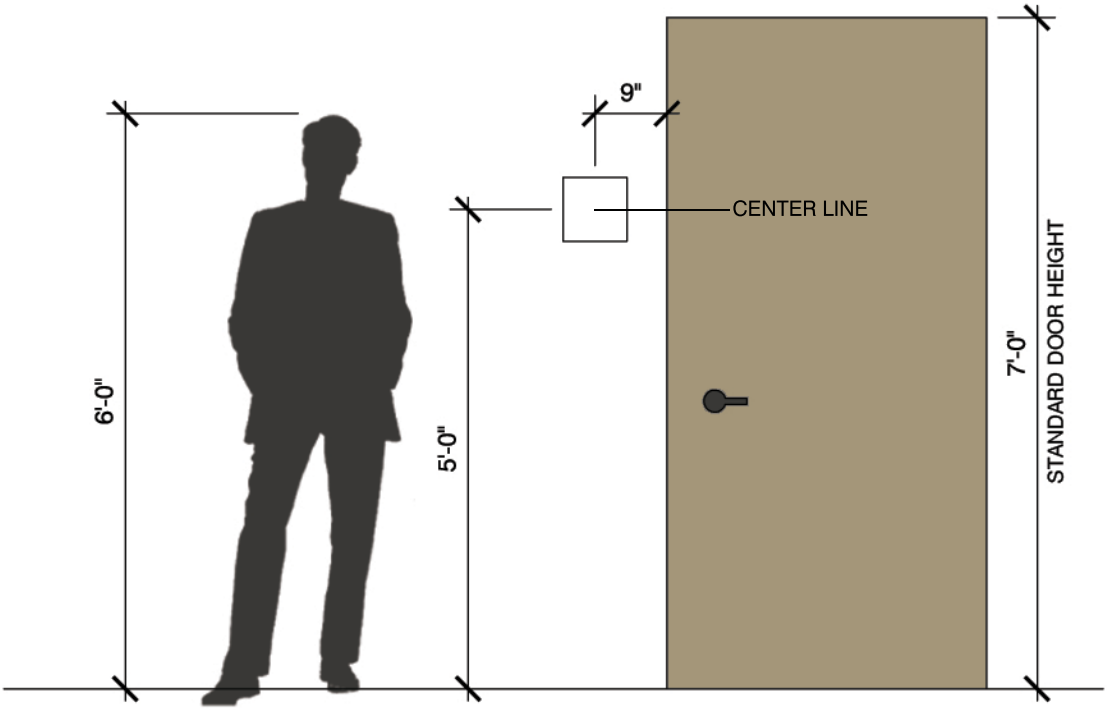
INSTALLATION SAMPLES

SIGN TYPE A3



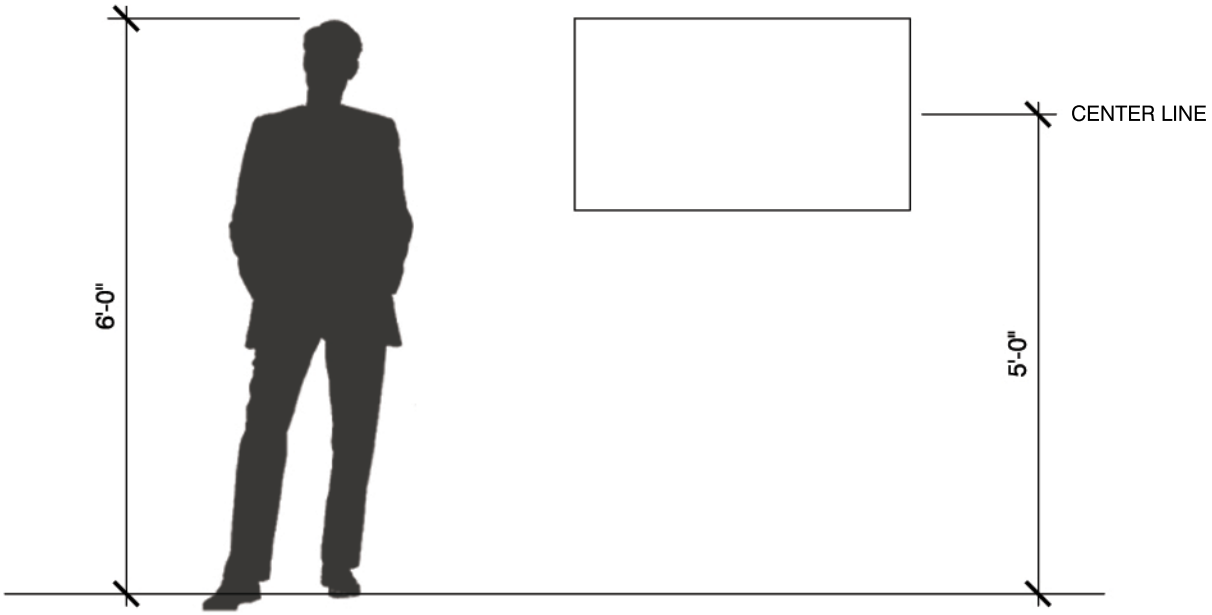
INSTALLATION SAMPLES

SIGN TYPE B1/B2



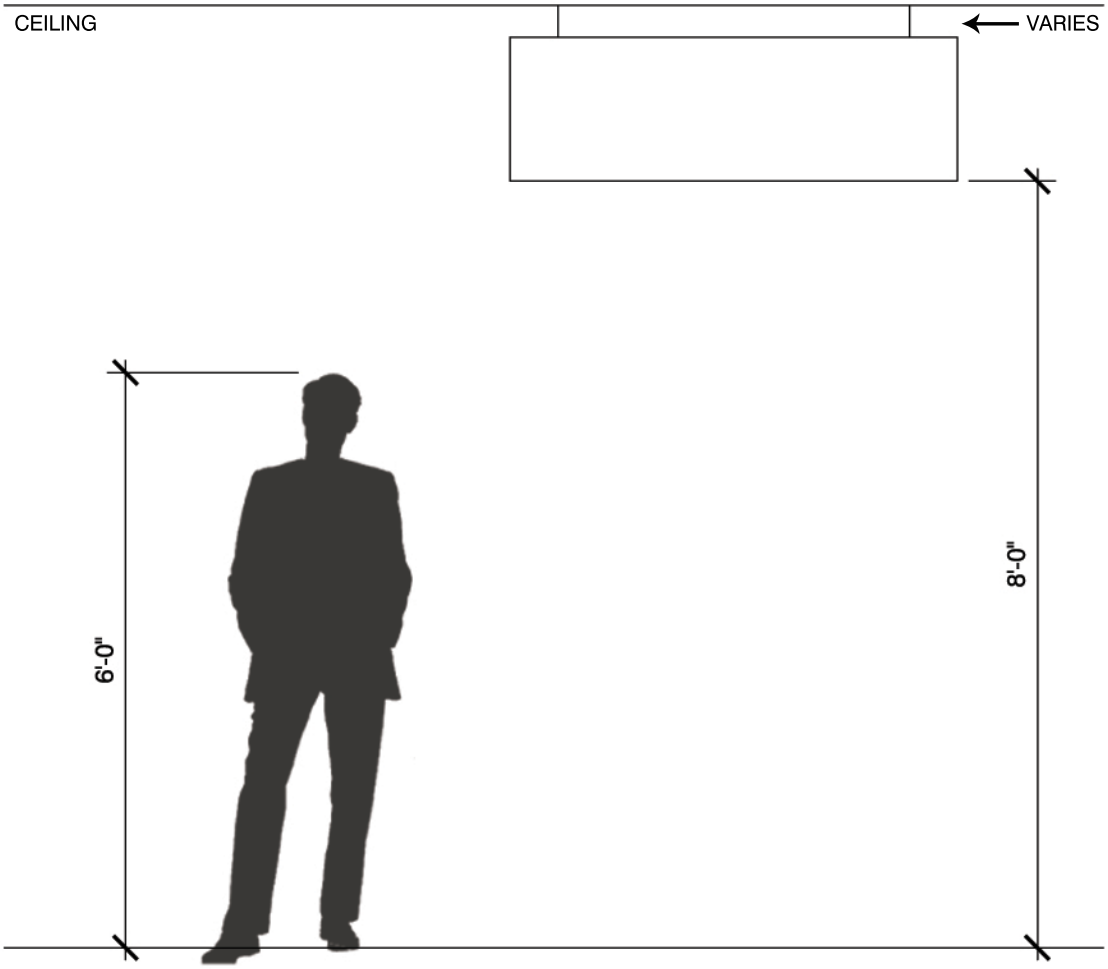
INSTALLATION SAMPLES

SIGN TYPE D1



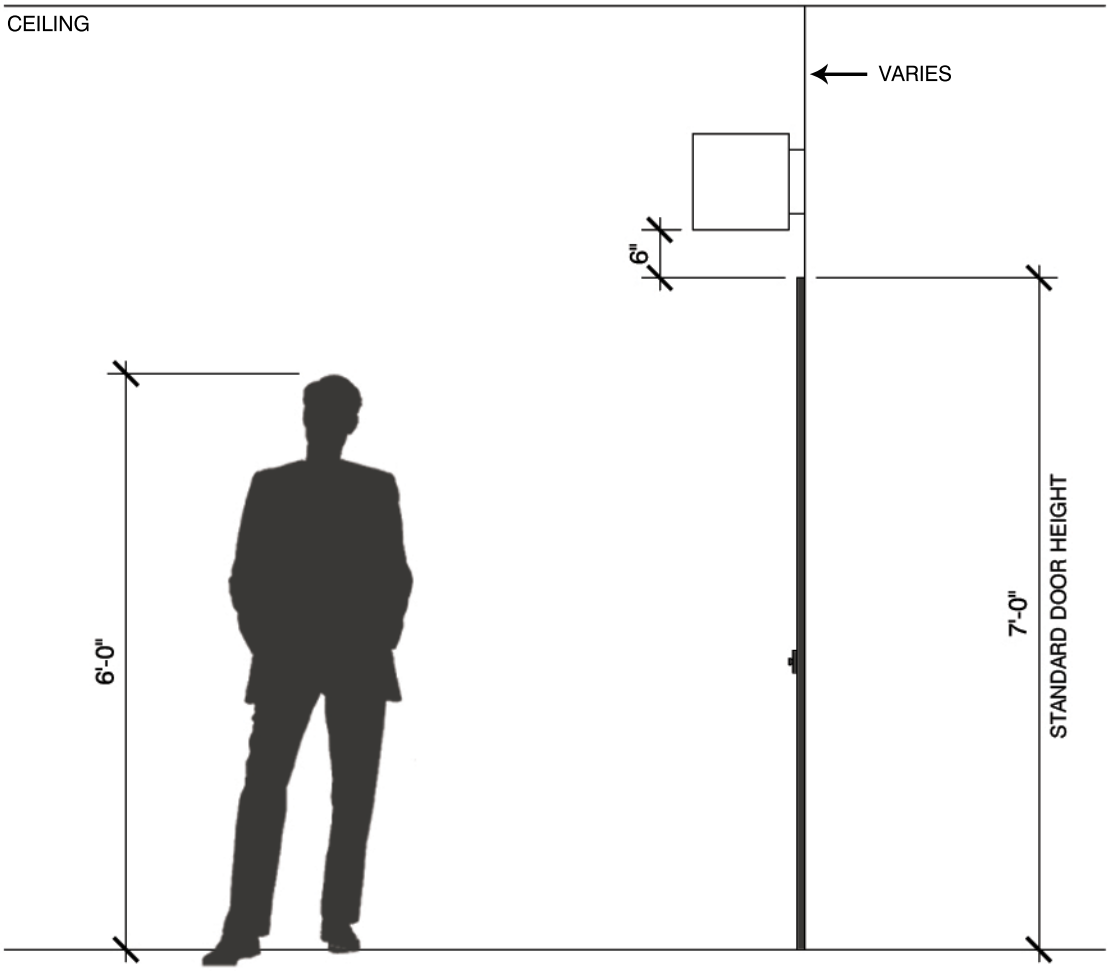
INSTALLATION SAMPLES

SIGN TYPE D2



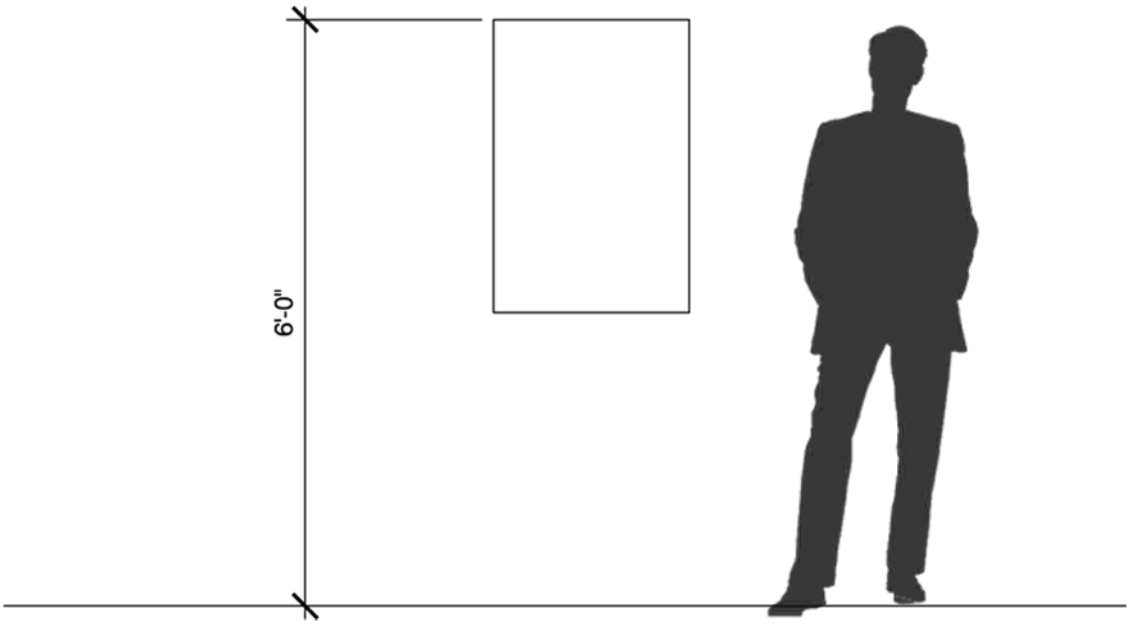
INSTALLATION SAMPLES

SIGN TYPE D3



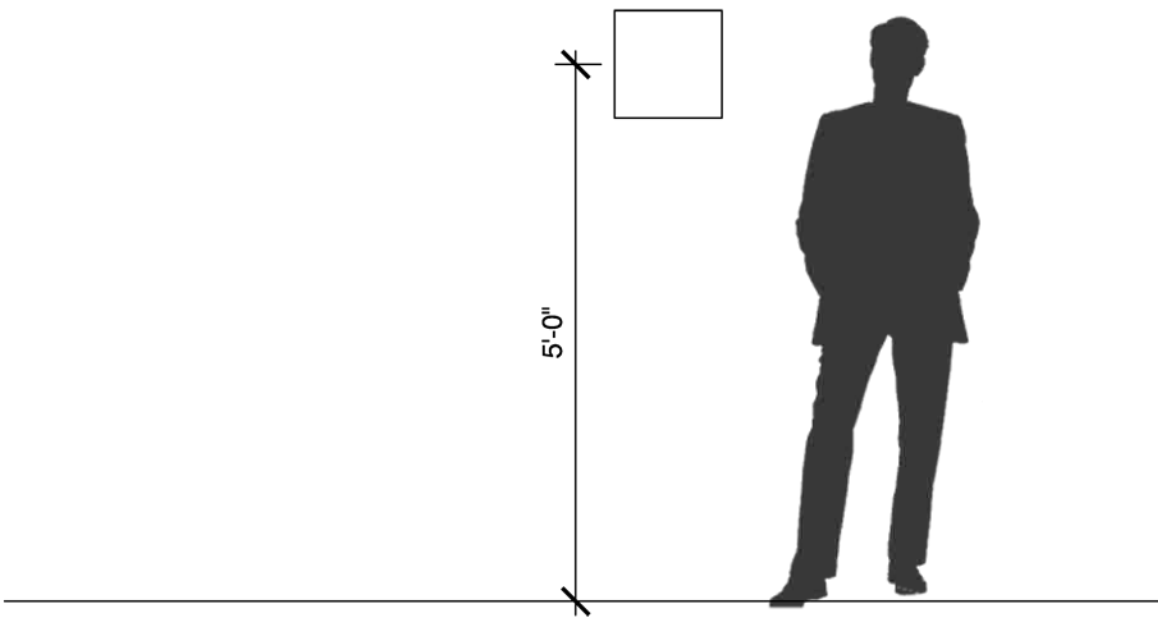
INSTALLATION SAMPLES

SIGN TYPE D4



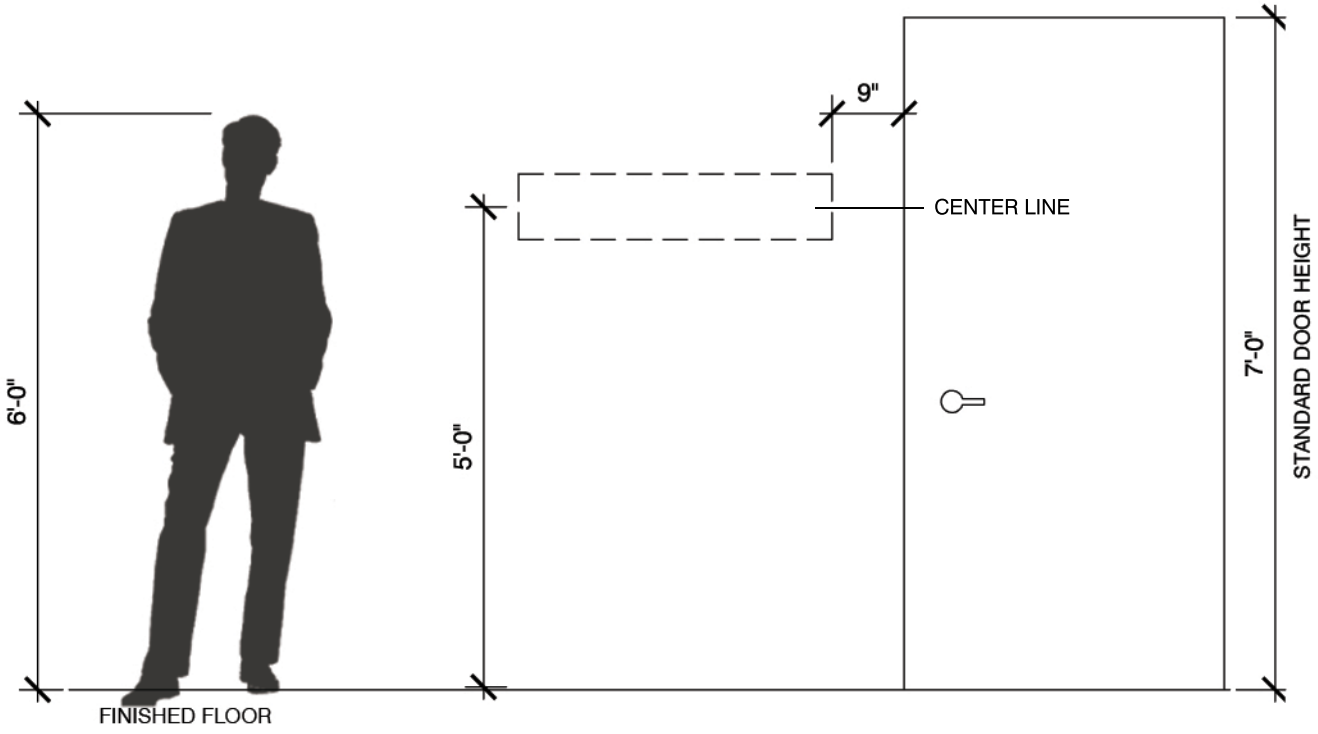
INSTALLATION SAMPLES

SIGN TYPE E1



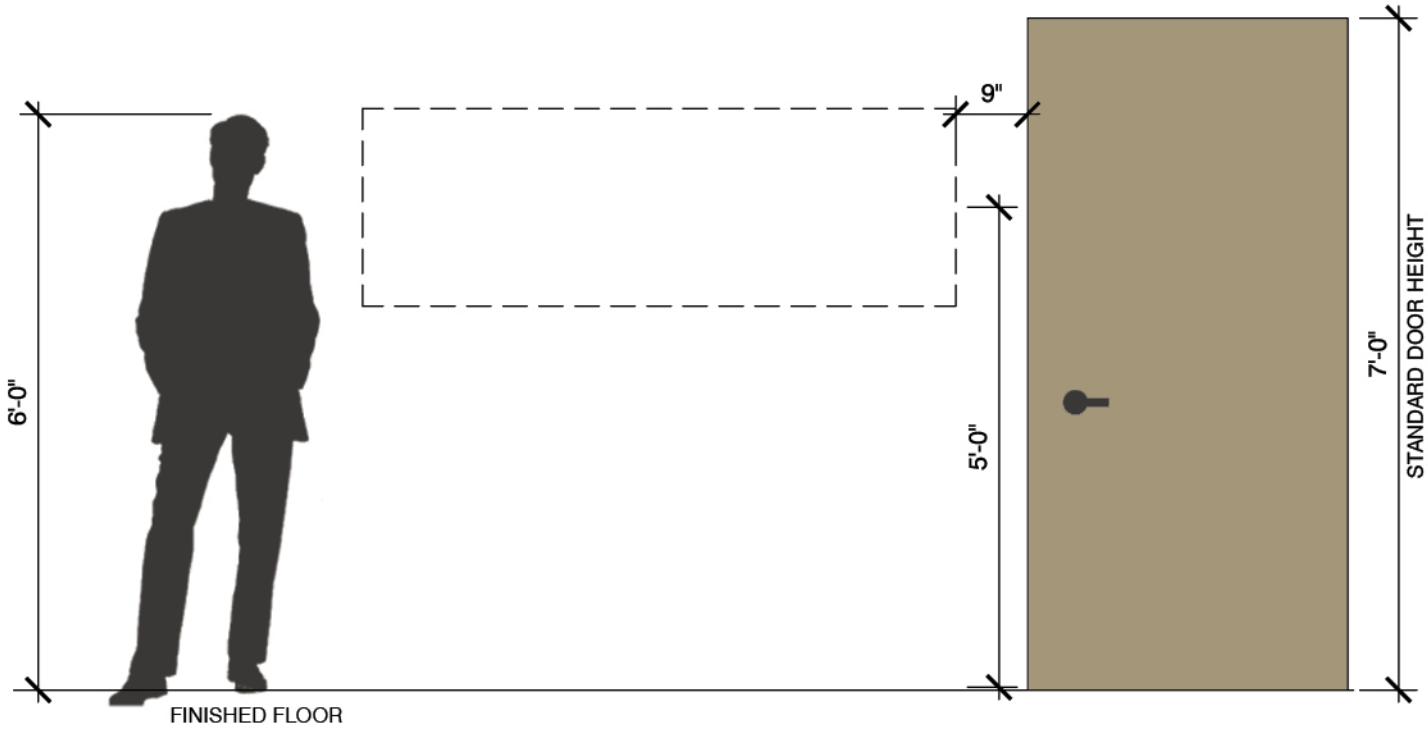
INSTALLATION SAMPLES

SIGN TYPE V1



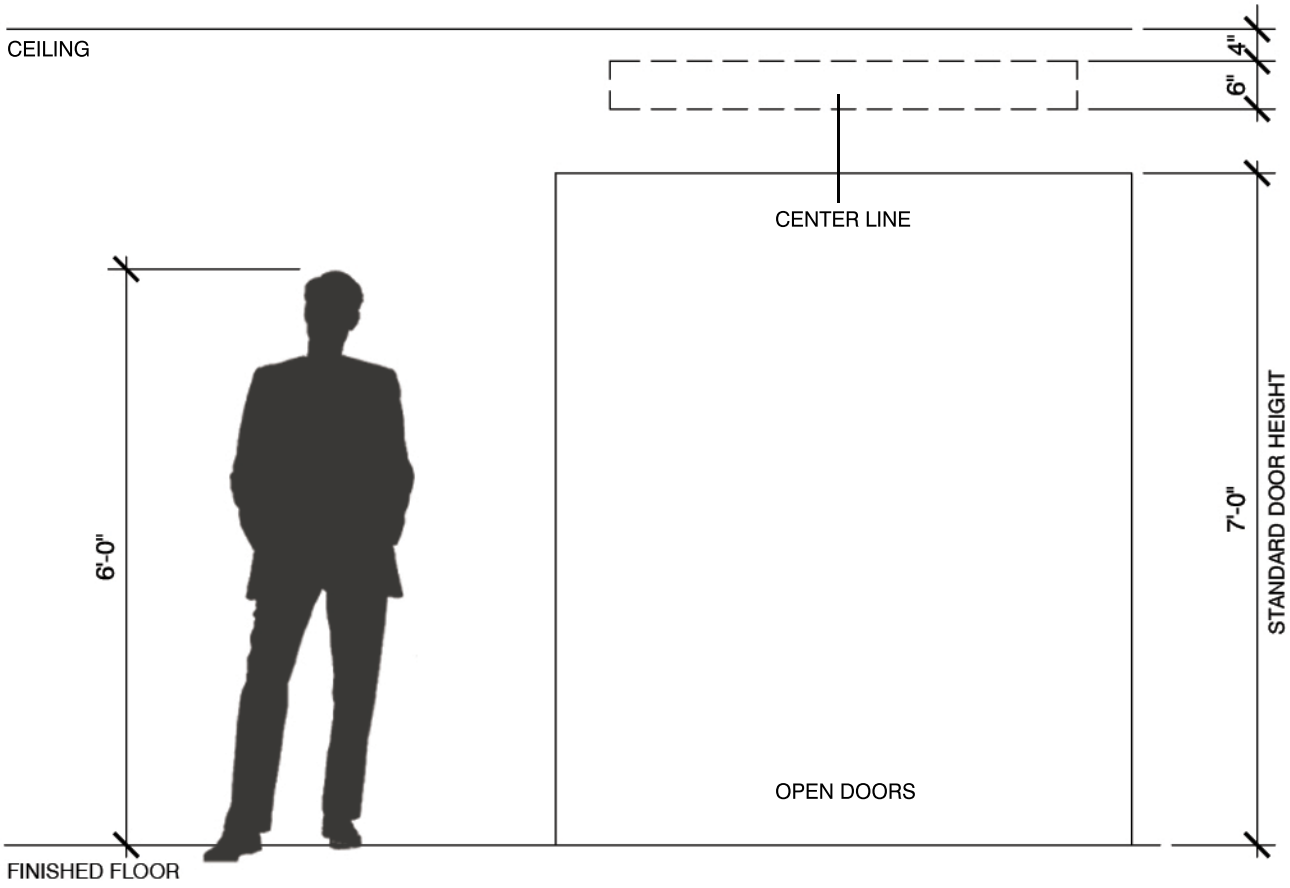
INSTALLATION SAMPLES

SIGN TYPE V2



INSTALLATION SAMPLES

SIGN TYPE V3



Design Criteria

The sizes, layouts, and formats of the Standard Signage in this document have been carefully determined to meet the existing codes and the needs of SIUE. The below guidelines apply to all signage. Any signage that lies outside the specifications of this document are to be reviewed by the SIUE Facilities Department for approval.

The letterstyles for the attached signage are the following:

URW Grotesk T

ABCDEFGHIJKLMNOPQRSTUVWXYZ

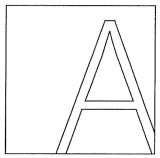
abcdefghijklmnopqrstuvwxyz

1234567890

The font sizes have been called out on the Specifications Section of this document. Please refer to the ADA Guidelines for any specialty signage that is not covered int his Master Plan Document.

Typography | Present your identity and create a visual description of yourself.

CO601 Satin Silver



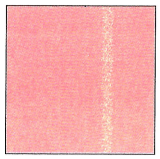
CO104 White

PTM: PMS 485, **GGBC 2024**

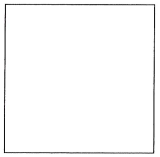
URW Grotesk

ABCDEFGHIJKLMNOPQRSTUVWXYZ
1234567890

Finishes | Limitless combinations. Sophistication defined through detail.

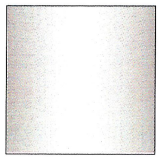


Abet **823SEI** Rosso Tango

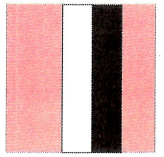


LS101 Arctic

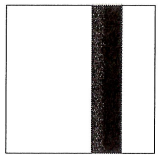
LS107 Abyss



LM101 Satin Silver



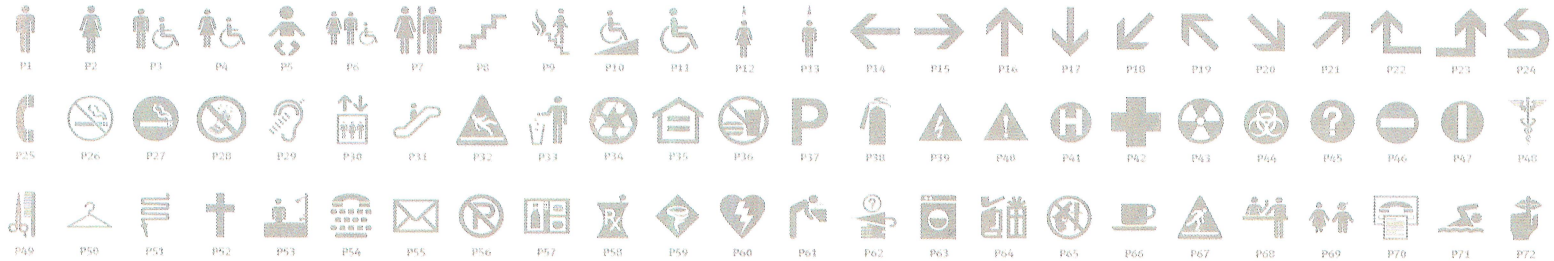
White Paper
Printed Pantone 485
White/Black Graphics



White Paper
Black Graphics

Natural Hardware

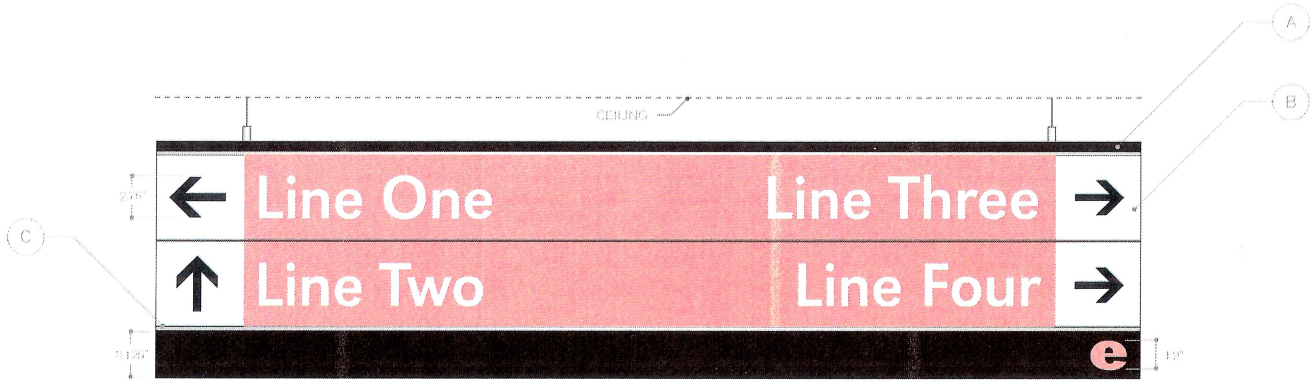
Pictograms | Images that speak. Effective and comprehensive visual communication.



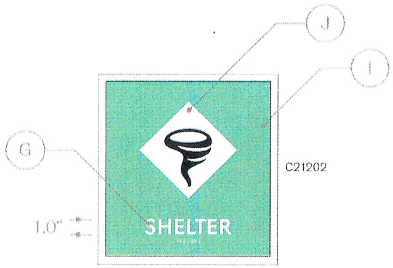
Presented By:

Project Specifications

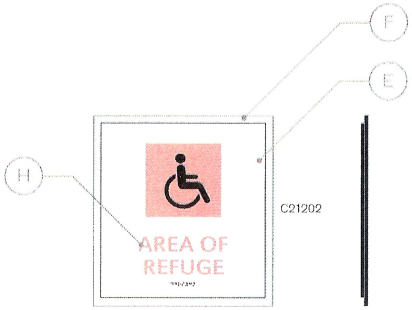
takeform
Architectural Graphics
One Mihor Way, Medina, New York, 14103
585.798.8838 585.798.8863



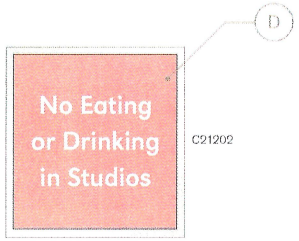
Type D.2C Custom Suspended Overhead
66.0"w X 16.0"h
Double Sided, Accommodates Insert



Type F.1
Style of F14
12.0"w X 12.75"h



Type F.2
Style of F14
12.0"w X 12.75"h



Type G
Style of F14
12.0"w X 12.75"h

BLK

Face Finish
(A) **LS107** Abyss

Hardware
(C) Natural

Face Finish 3
(E) **LS101** Arctic

Raised Copy
(G) **CO104** White
Font: URW Grotesk

Face Finish 4
(I) Abet **845SEI**

Insert
(B) Media: White Paper
Bckgrnd Color: Pantone 485
Copy: URW Grotesk, White & Black

Face Finish 2
(D) Abet **823SEI** Rosso Tango

Backer Finish
(F) **LM101** Satin Silver

Raised Copy 2
(H) **PTM:** PMS 485, **GGBC 2024**
Font: URW Grotesk

Direct Print Graphics
(J) **TC-**White, **TC-**Black & PMS 485

takeform
Architectural Graphics
One Mahar Way, Madison, New York, 14103
585.798.8888 585.798.8889
takeform.net

Adapt
ARCHITECTURAL SIGNAGE SYSTEM

Client:
Lawrence Group

Project:
SIU Edwardsville (Peck Hall)

Date: 05.01.12
Drawn By: LB

Filename:
SOU0063_122409_RND_rev3

Design Review By:

Revisions:
09.05.12LB
09.05.12JZ
09.07.12LB

Notes:
Not to scale. Dimensions indicated are approximate.

Sample text shown for layout only.

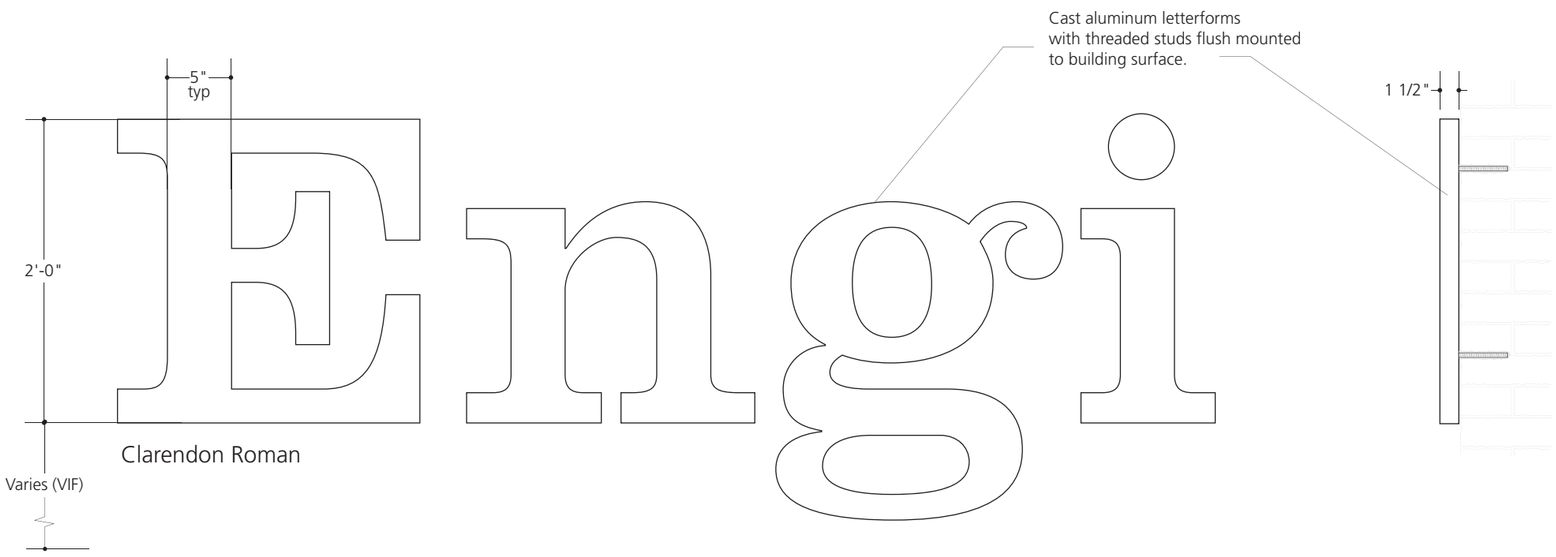
Window Backer if Required:
LS107 Abyss

Product Approval
NO CHANGES
Approved By: .....
Date: .....
WITH CHANGES AS NOTED
Approved By: .....
Date: .....
Product will be manufactured as indicated on this document. Please review carefully.

Rendering 1 of 1

1 Elevation ST13 - Building IDs
scale: 3/8"=1'-0"

Finish of cast letters changes depending on surface mounted to.
P2 for letters mounted on brick
P3 for letters mounted on aggregate



2 Detail
scale: 1 1/2"=1'-0"

SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE

1.26 ELEVATION DRAWINGS

Building ID

ST 12 Cast Letters

Materials

Letters cast in aluminum alloy c.443.2.

Install with threaded studs into drilled holes on building surface. Use mortar line on brick wall where possible. Inject clear silicone adhesive into holes prior to mounting letters.

Letters available from:

TheBronzePlace
5 Hamilton Avenue
Auburn, NY 13021
1.888.963.3369

Letters finished by fabricator in fluoropolymer powdercoat paint in specified colors. Check message schedule for color designation.

Layouts

Each sign location is a unique condition. Designer will provide rendered layouts of each location to illustrate intent. Fabricator/installer will place patterns on building to match intent as closely as possible.

DO NOT use paper patterns made from computer kerned layouts. Font has specialized conditions that will be addressed by designer. Designer will provide electronic files for each location layout. Fabricator to create paper install patterns from these files only.

THIS DRAWING REPRESENTS DESIGN INTENT ONLY.

Client/Project	Project No.
Southern Illinois University Edwardsville Campus Signage and Wayfinding	**0413604**

Date	Revisions	Scale
5.25.05	6.10.05	As Noted

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SECTION 102113 –TOILET COMPARTMENTS

PART 1 - GENERAL (Not Used)

PART 2 - PRODUCTS

2.1 COMPARTMENTS

A. Specify ceiling mounted with overhead brace.

B. Hinges: Integral, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees.

C. Brackets: Full-height continuous polymer or extruded aluminum.

D. Latch and Keeper: Manufacturer's standard recessed latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be accessible to people with disabilities.

2.2 SCREENS

A. Specify wall mounted.

B. Brackets: Full-height continuous polymer or extruded aluminum.

2.3 MATERIALS

A. Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, no-sightline system, and with homogenous color and pattern throughout thickness of material.

END OF SECTION 102113

SECTION 102600 – WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide wall protection behind drinking fountains.

1. Ceramic tile is also acceptable as wall protection behind drinking fountains.

B. Provide corner guards at heavy traffic areas.

PART 2 - PRODUCTS

2.1 CORNER GUARDS

A. Specify surface mounted stainless steel.

1. 4 feet high.

END OF SECTION 102600

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Soap and paper towel dispensers are to be located to minimize as much as possible soap and water dripping on counter tops and avoid water dripping from wet hands onto floors.

1.2 OWNER FURNISHED AND INSTALLED

A. Paper Towel Dispenser:

1. Georgia Pacific; GPT54338A Vita Push/Peddle Roll Dispenser.

B. Toilet Paper Dispenser:

1. Georgia Pacific; GPT59209 Jumbo Two Roll Toilet Tissue.

C. Soap Dispenser:

1. Renown; REN05189 GRY/WHT Foam Soap Dispenser.

D. Trash Cans.

E. Sanitary Napkin Dispenser:
1. Bobrick; B-4354

F. Sanitary Napkin Disposal.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. American Specialties, Inc.; Simplicity Series.

B. Bobrick Washroom Equipment, Inc.; Trimline Series.

C. Bradley Corporation; Contemporary Series.

2.2 DISPENSERS

A. Do not specify automatic dispensers of any kind.

2.3 PUBLIC-USE WASHROOM ACCESSORIES

A. Provide:
   1. Grab bars; stainless steel with slip-resistant texture in grip area.
   2. Mirrors; stainless steel channel frame.

2.4 SHOWER ROOM ACCESSORIES

A. Provide:

   1. Shower curtain rods; 1-14 inch OD stainless steel.
   2. Opaque vinyl shower curtains with chrome-plated or stainless steel hooks.
   3. Robe hooks; double prong stainless steel or stainless steel strip hooks as appropriate for use.

2.5 CHILDCARE ACCESSORIES

A. Provide:

   1. Diaper Changing Station: Surface mounted HDPE unit with built-in liner dispenser. Manufacturer

      a. American Specialties, Inc.
      b. Diaper Deck & Company, Inc.
      c. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.
      d. Koala Kare Products; a division of Bobrick Washroom Equipment, Inc.

END OF SECTION 102800

SECTION 104313 – AUTOMATIC EXTERNAL DEFIBRILLATORS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide automatic external defibrillators only as required by code.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 104313

SECTION 104413 – FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide fire protection cabinets for Owner provided Contractor installed fire extinguishers.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 104413

SECTION 105113 – METAL LOCKERS

PART 1 - GENERAL (Not Used)

PART 2 - PRODUCTS

2.1 LOCKERS

A. Varies by use. Generally specify metal lockers, 12” x 18” x 72” with sloped tops, base mounted on 4 inch high curbs.

B. Specify hasp for padlock.

END OF SECTION 105113

SECTION 105500 – POSTAL SPECIALTIES

PART 1 - GENERAL (Not Used)

PART 2 - PRODUCTS

2.1 LOCKS

A. Locks to be Best SFIC compatible. Coordinate lock/core installation with SIUE Key Control.

END OF SECTION 105500

SECTION 115200 – AUDIO-VISUAL EQUIPMENT

PART 1 - GENERAL

1.1 OWNER FURNISHED AND INSTALLED

A. Smart Podiums: Provided by SIUE OIT. Coordinate requirements.

1. Locks: Best SFIC compatible.

B. Projectors: Provided by SIUE OIT. Coordinate requirements.

C. Projection Screens: Provided by SIUE OIT. Coordinate requirements.

D. Smartboards: Provided by SIUE OIT. Coordinate requirements.

E. LCD Displays: Provided by SIUE OIT. Coordinate requirements.

F. Refer to current SIUE ITS Standards and Services for Construction.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 115200

SECTION 115313 – LABORATORY FUME HOODS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Specify fume hoods designed to meet ASHRAE requirements for face velocities, etc.

B. Specify fume hoods designed to meet LEED requirements.

PART 2 - PRODUCTS

2.1 LABORATORY FUME HOODS

A. Manufacturers:

1. Advanced Lab Concepts, 15900 Bratton Lane, Austin, TX 78728 Tel: 800 711-5227.
2. CiF Lab Solutions L.P., 53 Courtland Avenue, Vaughan, ON Canada L4K 3T2 - Tel: 905 738-5821.
3. Jamestown Metal Products, Inc., 178 Blackstone Avenue, Jamestown, NY 14701 Tel: 716 665-5313.
4. Kewaunee Scientific Corporation, 2700 West Front Street, Statesville, NC 28677 - Tel 877-572-0263.
5. Labconco Corporation, 8811 Prospect Avenue, Kansas City, MO 64132 Tel: 1-800-821-5525.
6. Mott Manufacturing Limited, 452 Hardy Road, P. O. Box 1120, Brantford, ON, Canada N3T 5T3 Tel: 519 752-7825.

B. Safety label: Labels shall indicate safe operating conditions with respect to fume hood sash position. Labels solely indicating 100 fpm face velocity sash position are not acceptable. Manufacturer: Lab Safety Supply Inc., P. O. Box 1368, Janesville, WI 53547 Tel: 800 356-0783.

C. Finish: Chemically resistant.

END OF SECTION 115313

SECTION 122116 – VERTICAL LOUVER BLINDS

PART 1 - GENERAL (Not Used)

PART 2 - PRODUCTS

2.1 VERTICAL LOUVER BLINDS

A. Vertical Blind Head Rail System Manufacturers:

1. Graber.
2. Hunter Douglas.
3. Louverdrape.
4. Sunteca Systems.

B. Head Rail: Extruded aluminum.

C. Vains: UV-stabilized PVC. 3.5 inches wide

D. Operation: Manual.

END OF SECTION 122116

SECTION 123553 – LABORATORY CASEWORK

PART 1 - GENERAL (Not Used)

PART 2 - PRODUCTS

2.1 LOCKS

A. Manufacturer's standard cam Best SFIC compatible locks.

1. Provide spare keys and blanks.

2.2 MATERIALS

A. Specify either metal or wood casework.

1. Wood Laboratory Casework:

a. Manufacturers:

1) Advanced Lab Concepts, 15900 Bratton Lane, Austin, TX 78728 Tel: 800 711-LABS.
2) CiF Lab Casework Solutions, 56 Edilcan Drive, Ontario, Canada L4K 3S6 Tel: 905 738-5821.
3) Diversified Woodcrafts, Inc., 300 South Krueger Street, Suring, WI 54174 Tel: 920 842-2136.
4) Mott Manufacturing Limited., 452 Hardy Road, P. O. Box 1120, Brantford, ON, Canada N3T 5T3 Tel: 519 752-7825.
5) Thermo Fisher Scientific, 1316 18th Street, Two Rivers, WI 54241 Tel: 920 793-1121.

b. Comply with AWI quality standards.
c. Toe Space:

1) Provide at all tall cabinets to match base cabinet units.
2) Provide at all fully-exposed sides of cabinets, including locations such as the end of island benches, the end of peninsula benches, and outside-corner cabinets.

d. Extended Ends: At end-of-run base cabinets, provide extended end to cabinet to create closure to the wall without the use of filler panels. Extended end shall be edgebanded on front, bottom, and top edges. Back edge shall be scribed to the wall with a tight hairline joint. Field-applied panels do not meet this requirement.
e. Flush interiors: Set cupboard bottom flush with front-end facers. Surface mounted bottoms and offsets caused by front face frames that interfere with ease of cleaning are not acceptable.

f. Wood Finish: Stain and chemical resistant finish.

2. Metal Laboratory Casework:

a. Manufacturers:

1) Advanced Lab Concepts, 15900 Bratton Lane, Austin, TX 78728 Tel: 800 711-LABS.
2) Bedcolab Ltd, 2305 Francis Hughes Avenue, Laval, Quebec, Canada H7S 1H5 Tel 514 384-2820.
3) Jamestown Metal Products, Inc., 178 Blackstone Avenue, Jamestown, NY 14701 Tel: 716 665-5313.
4) Mott Manufacturing Limited., 452 Hardy Road, P. O. Box 1120, Brantford, ON, Canada N3T 5T3 Tel: 519 752-7825
5) Thermo Fisher Scientific, 1316 18th Street, Two Rivers, WI 54241 Tel: 920 793-1121.

3. Corrosives and Flammable Liquid/Solvent Storage Cabinets:

a. Manufacturers:

1) Eagle Manufacturing Company, 2400 Charles St., Wellsburg, WV 26070 Tel: 304 737-3171.
2) Justrite Manufacturing Company, 2454 Dempster St., Suite 300, Des Plaines, IL 60016 Tel: 800 798-9250.

b. Locks: Cabinet doors shall be lockable.
c. Venting: Vent to adjacent fume hood or to exhaust duct system if not adjacent to fume hood.
d. Finish: Chemical resistant.

B. Specify chemical resistant countertops at laboratories.

END OF SECTION 123553

SECTION 123623 – PLASTIC-LAMINATE-CLAD COUNTERTOPS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide plastic-laminate countertops at non-wet areas.

B. ADA Protection Skirt: Provide lightweight removable panels. Plastic-laminate panels are not acceptable.

C. Trash or Recycle Disposal: Do not build trash or recycle disposal into countertop.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 123623

SECTION 123661 – SOLID SURFACE COUNTERTOPS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide solid surface countertops with integral bowls at toilet rooms.

B. ADA Protection Skirt: Provide lightweight removable panels.

C. Trash or Recycle Disposal: Do not build trash or recycle disposal into countertop.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 123661

SECTION 124813 – ENTRANCE FLOOR MATS

PART 1 - GENERAL (Not Used)

PART 2 - PRODUCTS

2.1 GRILLES

A. Provide “Pedimat” type, recessed in concrete slab.

END OF SECTION 124813

SECTION 129300 – SITE FURNISHINGS

PART 1 - GENERAL (Not Used)

PART 2 - PRODUCTS

2.1 BIKE RACKS

A. Manufacturers:

1. A A A Ribbon Rack Co., Inc.; Division of Brandir International, Inc.
2. American Bicycle Security Company.
3. BRP Enterprises, Inc.
4. Columbia Cascade Company.
5. Creative Pipe, Inc.
6. DuMor Inc.

B. Frame: 2-3/8 inch OD galvanized Schedule 40 steel pipe with powder coating finish. All welded construction.

C. Profile: Continuous ribbon configuration:

D. Style: Double-side parking.

E. Capacity: No fewer than 10 bicycles per section.

F. Installation: Cast into concrete.

END OF SECTION 129300

SECTION 132600 – CUSTODIAL REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Lockable storage/Office: SIU property vacuums, scrubbers and etc. as well as supplies such as 20-30 cases of paper towels and 15-25 cases of toilet paper and a desk with phone access (70 - 80 sq. ft.).

B. Lockable storage on each floor for supplies and equipment.

C. Personnel Lockable storage: For personal while working i.e. coats, schoolbooks, lunch box and etc. (lockers).

D. Lockable chemical storage separate for office area.

E. Adequate wet closets throughout building with space to have access with equipment and chemical storage space. (Typically 1 per floor, long buildings should have 1 at each end of each floor.)

F. Provide adequate power outlets to allow use of equipment without requiring extension cords (50’ centers).

G. Provide adequate light for cleaning in the dark.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 132600

SECTION 142000 – ELEVATORS

PART 1 - GENERAL

1.1 SIUE GUIDELINES FOR ELEVATOR DESIGN

A. Elevator design standards and technology change periodically and frequently, to that effect, the elevator controller shall be maintainable by a qualified technician for both parts and software, proprietary controllers shall be avoided.

B. The expected elevator life shall be in the 25 to 30 year span.

C. An elevator consultant shall be part of the design team.

D. Elevator Types:

1. Hydraulic elevators shall be used for 2-3 stops maximum, 14 ` max travel per stop.

    a. 125 FPM travel speed for passenger and 75 FPM for freight elevators.
    b. Load capacity shall be 5,000 lbs.

2. Traction elevators shall be used for 3-4 stops if volume of use requires it, and shall be MRL when load requirements are greater than 5,000 lbs.

E. Elevator shall be Model Space or equal.

F. Elevator shafts shall be sprinkled unless otherwise specified.

1.2 WARRANTY

A. Warranty Period: Two years.

PART 2 - PRODUCTS

2.1 PERFORMANCE

A. Non-Proprietary Equipment: Where components are not otherwise indicated, provide standard components, published by manufacturer as included in standard pre-engineered elevator systems and as required for a complete system.

1. Provide an affidavit of Non-Proprietary Equipment representing compliance with established standards for Universal Serviceability and Maintainability. Include the following provisions:

a. Spare parts with regard to universal availability to elevator contractor designated by the Using Agency to maintain and service the equipment. No exchange-only provisions.
b. Diagnostics controls with all available diagnostic function available on board or in a separate device, providing nrestricted access to all parameters necessary to adjust and maintain operation by any elevator contractor.
c. Training. After warranty period, OEM training shall be made available to anyone who desires to learn maintenance and adjustment of the system. Provide training at reasonable cost, appropriate to the level desired.
d. Unrestricted Technical Support to Using Agency’s designated elevator contractor(s).
e. Unrestricted Engineering support to Using Agency’s designated elevator contractor(s).
f. Availability of complete Replacement Documentation at Using Agency’s request; at reasonable cost.

2.2 ELEVATORS

A. Provide electric traction type elevators.

B. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. KONE Inc.
2. Otis Elevator Co.
3. Schindler Elevator Corp.
4. ThyssenKrupp Elevator.

2.3 LOCKS

A. Elevators that include keyed switches for level or door access to be Best SFIC compatible, not tubular keyed locks. (from Key Control)

B. Elevator keys to be Best 7-pin core compatible. (from Carpenter’s meeting)

2.4 CONTROLS

A. Provide soft start for elevator controls.

2.5 FINISHES

A. Car Enclosure:

1. Front Wall: Stainless steel No. 4 finish.
2. Side and Rear Walls: Plastic laminate.
3. Door Faces: Stainless steel No. 4 finish.

B. Hoistway Entrance: Stainless steel No. 4 finish.

END OF SECTION 142000

SECTION 210553 - FIRE SUPPRESSION IDENTIFICATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Identification of products installed under Division 21.

B. Equipment naming convention.

1.2 VALVES:

A. All valves (except shutoff valves at equipment) shall have numbered tags.

B. Provide or replace numbered tags on all existing valves that are connected to new systems or that have been revised.

C. Provide all existing valves used to extend utilities to this project with numbered tags. Review tag numbering sequence with the Owner prior to ordering tags.

D. Secure tags with heavy duty key chain and brass "S" link or with mechanically fastened plastic straps.

E. Attach to handwheel or around valve stem. On lever operated valves, drill the lever to attach tags.

F. Number all tags and show the service of the pipe.

G. Provide two sets of laminated 8-1/2" x 11" copies of a valve directory listing all valves, with respective tag numbers, uses, and locations. The directory shall be reviewed by the Owner and Architect/Engineer prior to laminating final copies. Laminated copies shall have brass eyelet in at least one corner for easy hanging.

1.3 PIPE MARKERS:

A. Adhesive Backed Markers: Use Brady Style 1, 2, or 3 on pipes 3" diameter and larger. Use Brady Style 4, 6, or 8 on pipes under 3" diameter. Similar styles by other listed manufacturers are acceptable. Secure all markers at both ends with a wrap of pressure sensitive tape completely around the pipe.

B. Apply markers and arrows in the following locations where clearly visible:
   a. At each valve.
   b. On both sides of walls that pipes penetrate.
   c. At least every 20 feet along all pipes.
   d. On each riser and each leg of each "T" joint.
   e. At least once in every room and each story traversed.

C. Underground Pipe Markers: Install 8" to 10" below grade, directly above buried pipes.

1.4 EQUIPMENT

A. All equipment not easily identifiable such as controls, relays, gauges, etc.; and all equipment in an area remote from its function such as air handling units, exhaust fans, filters, reheat coils, dampers, etc.; shall have nameplates or plastic tags listing name, function, and drawing symbol. Do not label exposed equipment in public areas.

B. Fasten nameplates or plastic tags with stainless steel self-tapping screws or permanently bonding cement.

1.5 MISCELLANEOUS

A. Attach self-adhesive vinyl labels at all duct access doors used to reset fusible links or actuators on fire, fire/smoke, or smoke dampers. Lettering shall be a minimum of 1/2" high. Labels shall indicate damper type.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Nameplates: Black enamel background with natural aluminum border and engraved letters furnished with two mounting holes and screws.

B. Brass Tags: Brass background with engraved black letters. Tag size minimum 1-1/2" square or 1-1/2" round.

C. Vinyl Pipe Markers: Colored vinyl with permanent pressure sensitive adhesive backing.

D. Underground Pipe Markers: Bright colored continuously printed plastic ribbon tape 6"wide by 3.5 mils thick, manufactured for direct burial, with aluminum foil core for location by non-ferric metal detectors and bold lettering identifying buried item.

E. Tracer Wire:

1. Single copper conductors shall be solid or stranded annealed or hard uncoated copper per UL83 and ASTM requirements. Tracer tape or copper-coated steel wire is not acceptable.

2. Conductor shall be insulated with HMWPE as specified and applied in a concentric manner. The minimum at any point shall not be less than 90% of the specified average thickness in compliance with UL 83.

3. Tracer wire shall be continuously spark tested at 7500 Volts DC. Other electrical and mechanical tests shall be in accordance with UL 1581.

2.2 EQUIPMENT NAMING CONVENTION

A. All new equipment shall receive a designation consisting of a building number (four characters - contact Campus personnel for the building numbers), an equipment code (three characters), and then a floor level followed by the actual equipment number (four characters).

B. Equipment Code - the first three characters equipment type:

1.	Fire Pump	FPS
2.	Inspector Test Station	ITS

EXAMPLE: **7006/ITS/2002** = DUNHAM HALL, INSPECTOR, LOCATED ON THE SECOND FLOOR, THE SECOND INSPECTOR TEST STAION ON THAT LEVEL.

EXAMPLE: **7018/FPS/B001** = FOUNDERS HALL, FIRE PUMP, LOCATED IN THE BASEMENT.

2.3 SCHEDULE

A. Pipes to be marked:

Pipe Service	Lettering Color	Background Color
Fire Protection Water	White	Red
Sprinkler Water	White	Red
Tracer Wire - Water Pipe Lines	---	Blue
Tracer Wire - All other buried types	---	Green

B. All piping downstream of the fire protection backflow preventer, upstream of sprinkler zone valves, standpipe piping, and combination sprinkler standpipe piping shall be labeled Fire Protection Water. All piping downstream of sprinkler zone valves shall be labeled Sprinkler Water.

END OF SECTION 210553

SECTION 211300 - FIRE PROTECTION SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Pipe, Fittings, Valves, and Connections for Fire Protection System.

1.2 EXTRA STOCK

A. Provide metal storage cabinet, wrenches for each sprinkler type, and extra sprinklers per NFPA 13 and applicable building code.

1.3 SYSTEM DESCRIPTION

A. System shall interface with building fire alarm system. Provide all required wiring.

B. Provide wet pipe and dry pipe sprinkler system(s) to NFPA 13 and building code requirements as required by Owner's insurance company and as shown on the drawings. Provide standpipe system to NFPA 14 and building code requirements as required by Owner's insurance company and as shown on the drawings.

1.4 JOB CONDITIONS

A. Fire Protection Contractor shall determine the flow and pressure available at the service connection. The Fire Protection Contractor is responsible to verify this information and make all tests required. Base all pipe sizing and hydraulic calculations on flow test data no older than 18 months.

1.5 GENERAL REQUIREMENTS

A. All water used for testing and remaining in the piping system shall treated by corrosion solution company.

B. Do not install piping or other equipment above electrical switchboards or panelboards. This includes a dedicated space extending 25 feet from the floor to the structural ceiling with width and depth equal to the equipment. Fire protection equipment dedicated to the electrical equipment room or space may be installed above equipment if other alternatives are not available.

C. Center sprinklers in two directions in ceiling tiles and provide offsets as required.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

A. Pipe: 2" and Under - Schedule 40, black steel, ASTM A53. Threaded and coupled or flanged.

B. Pipe: 2-1/2" and Over - Minimum Schedule 10, black steel, grooved, ASTM A135.

C. Schedule 40 Galvanized Steel Pipe shall be utilized for Dry-Pipe System, Fire Pump Suction, Pipe and Fittings required up to Backflow Preventer

2.2 FLEXIBLE SPRINKLER HOSE WITH THREADED END FITTINGS

A. Flexible sprinkler hose may be utilized in lieu of hard pipe sprinkler drops.

B. UL listed per UL 2443.

C. Construction:

1. Hose:
   a. Type 304 stainless steel.
   b. Straight or elbow hose - maximum six (6)-foot hose length.
   c. 1/2” or 3/4” outlet.
   d. 175 psi rated pressure.
   e. Leak-tested minimum 7/8”.
   f. Minimum 7/8” hose Braided hose.
   g. O-ring sealed joints are not acceptable.
2. Ceiling Bracket:
   a. Zinc plated or galvanized steel – 24” and 48” sizes.
   b. Flexible hose attachment: Open hub or set screw.
3. Unit may be prepackaged with sprinkler head.

D. Acceptable Manufacturers: FlexHead Industries, Victaulic Aquaflex.

2.3 BACKFLOW PREVENTERS

A. Provide double check backflow preventers for fire service line serving building.

END OF SECTION 211300

SECTION 213000 - FIRE PUMPS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Fire Pump Package.

B. Fire Pump Motor.

C. Electric Pressure Maintenance (Jockey) Pump.

D. Controllers.

1.2 SYSTEM DESCRIPTION

A. Electric motor driven vertical in-line or horizontal fire pump with jockey pump and electric controllers.

1.3 REGULATORY REQUIREMENTS

A. All materials and installation shall conform to NFPA 20.

B. Provide certificate of compliance from authority having jurisdiction indicating approval of field acceptance tests.

C. All material, equipment and installation shall be approved by the State Insurance Office State Fire Marshal and the Owner's insurance company.

1.4 OPERATION AND MAINTENANCE DATA

A. Include manufacturer’s instructions, start-up data, and trouble-shooting check lists for pumps, drivers and controllers, cleaning procedures, replacement parts lists, and repair data for pumps, drivers and controllers.

1.5 MAINTENANCE SERVICE

A. Furnish service and maintenance of fire pump, driver and controller for one year from Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Fire Pumps:

1. Aurora Pumps
2. Fairbanks Morse
3. Peerless Pump
4. A-C Pump; ITT Industries
5. Patterson Pump
6. Or equivalent

B. Controllers:

1. Aquarius
2. Firetrol
3. Masters
4. Cutler-Hammer
5. Or equivalent

END OF SECTION 213000

SECTION 220553 - PLUMBING IDENTIFICATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Identification of products installed under Division 22.

B. Equipment naming convention.

C. Equipment labeling.

1.2 VALVES:

A. All valves (except shutoff valves at equipment) shall have numbered tags.

B. Provide or replace numbered tags on all existing valves that are connected to new systems or that have been revised.

C. Provide all existing valves used to extend utilities to this project with numbered tags. Review tag numbering sequence with the Owner prior to ordering tags.

D. Secure tags with heavy duty key chain and brass "S" link or with mechanically fastened plastic straps.

E. Attach to handwheel or around valve stem. On lever operated valves, drill the lever to attach tags.

F. Number all tags and show the service of the pipe.

G. Provide two sets of laminated 8-1/2" x 11" copies of a valve directory listing all valves, with respective tag numbers, uses, and locations. The directory shall be reviewed by the Owner and Architect/Engineer prior to laminating final copies. Laminated copies shall have brass eyelet in at least one corner for easy hanging.

1.3 PIPE MARKERS:

A. Adhesive Backed Markers: Use Brady Style 1, 2, or 3 on pipes 3" diameter and larger. Use Brady Style 4, 6, or 8 on pipes under 3" diameter. Similar styles by other listed manufacturers are acceptable. Secure all markers at both ends with a wrap of pressure sensitive tape completely around the pipe.

B. Apply markers and arrows in the following locations where clearly visible:

1. At each valve.

2. On both sides of walls that pipes penetrate.

3. At least every 20 feet along all pipes.

4. On each riser and each leg of each "T" joint.

5. At least once in every room and each story traversed.

C. Underground Pipe Markers: Install 8" to 10" below grade, directly above buried pipes.

1.4 EQUIPMENT:

A. All equipment not easily identifiable such as controls, relays, gauges, etc.; and all equipment in an area remote from its function such as air handling units, exhaust fans, filters, reheat coils, dampers, etc.; shall have nameplates or plastic tags listing name, function, and drawing symbol. Do not label exposed equipment in public areas.

B. Fasten nameplates or plastic tags with stainless steel self tapping screws or permanently bonding cement.

1.5 MISCELLANEOUS:

A. Attach self-adhesive vinyl labels at all duct access doors used to reset fusible links or actuators on fire, fire/smoke, or smoke dampers. Lettering shall be a minimum of 1/2" high. Labels shall indicate damper type.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Nameplates: Black enamel background with natural aluminum border and engraved letters furnished with two mounting holes and screws.

B. Brass Tags: Brass background with engraved black letters. Tag size minimum 1-1/2" square or 1-1/2" round.

C. Vinyl Pipe Markers: Colored vinyl with permanent pressure sensitive adhesive backing.

D. Underground Pipe Markers: Bright colored continuously printed plastic ribbon tape 6"wide by 3.5 mils thick, manufactured for direct burial, with aluminum foil core for location by non-ferric metal detectors and bold lettering identifying buried item.

E. Tracer Wire:

1. Single copper conductors shall be solid or stranded annealed or hard uncoated copper per UL83 and ASTM requirements. Tracer tape or copper-coated steel wire is not acceptable.

2. Conductor shall be insulated with HMWPE as specified and applied in a concentric manner. The minimum at any point shall not be less than 90% of the specified average thickness in compliance with UL 83.

3. Tracer wire shall be continuously spark tested at 7500 Volts DC. Other electrical and mechanical tests shall be in accordance with UL 1581.

2.2 EQUIPMENT NAMING CONVENTION

All new equipment shall receive a designation consisting of a building number (four characters - contact Campus personnel for the building numbers), an equipment code (three characters), and then a floor level followed by the actual equipment number (four characters).

A. Equipment Code - the first three characters equipment type:

1.	Domestic Hot Water Circulating Pump	DCP
2.	Domestic Water Heater - Electric	WHE
3.	Domestic Water heater - Gas	WHG
4.	Domestic Water Booster Pump	DWP

EXAMPLE: **7000/WHE/2002** = DUNHAM HALL, ELECTRIC DOMESTIC WATER HEATER, LOCATED ON THE SECOND FLOOR, THE SECOND ELECTRIC WATER HEATER ON THE SECOND FLOOR.

EXAMPLE: **7018/DWP/B001** = FOUNDERS HALL, DOMESTIC WATER BOOSTER PUMP, LOCATED IN THE BASEMENT, THE FIRST DOMESTIC BOOSER PUMP ON THAT LEVEL.

2.3 SCHEDULE

A. Pipes to be marked:

Pipe Service	Lettering Color	Background Color
Condensate Drain	Black	Yellow
Compressed Air	Black	Yellow
Domestic Cold Water	White	Green
Domestic Hot Water - 115°F	Black	Yellow
Domestic Hot Water - 140°F	Black	Yellow
Domestic Hot Water Circulating - 115°F	Black	Yellow
Domestic Hot Water Circulating - 140°F	Black	Yellow
Sanitary Sewer	Black	Yellow
Vent	Black	Yellow
Storm Sewer (Primary and Secondary)	White	Green

Pipe Service	Lettering Color	Background Color
Natural Gas	Black	Yellow
Non-Potable Water	Black	Yellow
All Underground Pipes	Varies	Varies
Medical Vacuum	Black	White
Waste Anesthetic Gas Disposal	White	Violet
Carbon Dioxide	White	Gray
Instrument Air	White	Red
Medical Air	Black	Yellow
Nitrogen	White	Black
Nitrous Oxide	White	Blue
Oxygen	White	Green
Deionized Water	White	Green
Distilled Water	White	Green
R.O. Water	White	Green
Fuel Oil Piping (Supply and Return)	Black	Yellow
Tracer Wire - Water Pipe Lines	---	Blue
Tracer Wire - Natural Gas Pipe Lines	---	Yellow
Tracer Wire - All other buried types	---	Green

B. Medical gas pipe markers shall include the system operating pressure.

C. Medical gas pipe markers for systems not listed shall meet the pipe labeling requirements of NFPA-99.

END OF SECTION 220553

SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Piping Insulation.

B. Insulation Jackets.

PART 2 - PRODUCTS

2.1 INSULATION

A. All insulation shall meet or exceed current AHSRAE 90.1 and International Energy Code requirements. All insulation shall be plenum rated and insulation must meet 25/50.

B. General Installation Requirements:

1. Continue insulation with vapor barrier through penetrations. This applies to all insulated piping. Maintain fire rating of all penetrations.

2. On all insulated piping, provide at each support an insert of same thickness and contour as adjoining insulation, between the pipe and insulation jacket, to prevent insulation from sagging and crushing. The insert shall be suitable for planned temperatures, be suitable for use with specific pipe material, and shall be a 180° cylindrical segment the same length as metal shields. Inserts shall be a cellular glass (for all temperature ranges) or molded hydrous calcium silicate (for pipe with operating temperatures above 70°F, with a minimum compressive strength of 50 psi. Factory fabricated inserts may be used. Rectangular blocks, plugs, or wood material are not acceptable. Temporary wood blocking may be used by the Piping Contractor for proper height; however, these must be removed and replaced with proper inserts by the Insulation Contractor.

3. Install metal shields between all hangers or supports and the pipe insulation. Shields shall be galvanized sheet metal, half-round with flared edges. Adhere shields to insulation. On cold piping, seal the shields vapor-tight to the insulation as required to maintain the vapor barrier, or add separate vapor barrier jacket.

4. On 1" and smaller piping routed through metal wall studs, provide a plastic grommet to protect the piping. The piping shall be insulated between the wall studs, and the insulation shall butt up to each stud.

C. Insulated Piping Operating Below 60°F:

1. Insulate fittings, valves, unions, flanges, strainers, flexible connections, flexible hoses, and expansion joints. Seal all penetrations of vapor barrier.

2. On piping operating below 60ºF in locations that are not mechanically cooled (e.g., penthouses, mechanical rooms, tunnels, chases at exterior walls, etc.), Elastomeric insulation shall be used.

3. All balance valves with fluid operating below 60°F shall be insulated with a removable plug wrapped with vapor barrier tape to allow reading and adjusting of the valve.

D. Insulated Piping Operating Between 60°F and 140°F:

1. Do not insulate flanges and unions, but bevel and seal ends of insulation at such locations. Insulate all fittings, valves and strainers.

E. Insulated Piping Operating Above 140°F:

1. Insulate fittings, valves, flanges, and strainers.

2. All balance valves with fluid operating above 140°F shall be insulated and an opening shall be left in the insulation to allow for reading and adjusting the valve.

2.2 JACKET COVERINGS

A. Aluminum Jackets: ASTM B209; 0.016" thick; stucco embossed finish with Z edge seams and aluminum bands for outdoor use.

B. Stainless Steel Jackets: Type 316 stainless steel; .010” thick; smooth finish with Z edge seams and stainless steel bands for outdoor use.

C. Plastic Jackets and Fitting Covers: High impact, glossy white, 0.020" thick for interior use and 0.030" thick for exterior use, self-extinguishing plastic. Suitable for use indoors or outdoors with ultraviolet inhibitors. 25/50 maximum flame spread/smoke developed.

D. Provide jacket cover an all exterior pips with insulation, including elastomeric insulation.

E. Provide jacket cover on all exposed piping below 8’-0” above floor.

F. Provide jacket cover on all piping in mechanical rooms subject to damage from normal operation.

2.3 SCHEDULE

Piping System	Insulation Type
A. Domestic Hot Water & Circulating	Glass Fiber
B. Domestic Cold Water - Potable and Non-Potable	Glass Fiber or Elastomeric
C. Storm Drainage (include drain bodies and all piping within the building, except underground)	Glass Fiber or Elastomeric
D. Plumbing Vents Within 10' from Roof Penetration	Glass Fiber or Elastomeric
E. Cooling Coil Condensate Drains & Dedicated Floor Drain Branch Piping, Sanitary and Indirect Waste Piping Conveying Fluids below 55°F	Elastomeric
F. Above Grade Drains at Ice Machines (include drain bodies, P-trap, and 10’ of downstream drain piping)	Elastomeric

END OF SECTION 220719

SECTION 220900 - INSTRUMENTATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Positive Displacement Meters.

B. Pressure Gauge.

C. Pressure Gauge Accessories.

D. Thermometers.

E. Test Plugs.

1.2 GENERAL INSTALLATION REQUIREMENTS

A. Install gauges and thermometers in locations where they are easily read from normal operating level.

B. Do not install instrumentation when areas are under construction, except for required rough in, taps, supports and test plugs.

1.3 PRESSURE GAUGES:

A. Connect pressure gauges to suction and discharge side of all pumps.

B. Provide snubber for each pressure gauge.

C. Provide coil syphon for each pressure gauge connected to steam piping.

1.4 THERMOMETERS:

A. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2 1/2" for installation of thermometer sockets.

B. Install thermometer sockets adjacent to control system thermostat, transmitter and sensor sockets.

PART 2 - PRODUCTS

2.1 POSITIVE DISPLACEMENT METERS (LIQUID)

A. Positive displacement disc type suitable for fluid with hermetically sealed register, remote reading to AWWA C706.

B. Provide water meters with bronze case with cast iron bottom cap.

C. Meters downstream of utility company meters shall be same manufacturer as utility company meter.

D. Install positive displacement meters with shutoff valves on inlet and outlet. Provide full line size valved bypass with globe valve for liquid service meters

E. Acceptable Manufacturers: Neptune, Badger, Hersey, or equivalent.

2.2 PRESSURE GAUGES

A. Gauges shall be 4-1/2" diameter with aluminum or stainless steel case with phosphor bronze bourdon tube, brass socket for water or oil application, 1/4" or 1/2" bottom connection. Gauges shall be 1% full scale accurate with bronze brushed brass movement and adjustable pointer. Standard ranges to be either pressure or pressure and vacuum as required of application.

B. Acceptable Manufacturers: Ashcroft, Marsh, Marshalltown, Miljoco, Trerice, U.S. Gauge Figure 1901, Weiss, Weksler, Wika, or equivalent.

C. Select gauge range for normal reading near center of gauge.

2.3 PRESSURE GAUGE ACCESSORIES

A. All pressure gauges shall have valves and pressure snubbers. All pressure gauges on steam shall have pigtail syphon.

B. Shutoff Valve: 1/4 ball valve as specified for each piping system.

C. Pressure snubber, brass with 1/4" connections, porous metal type.

2.4 THERMOMETERS

A. Alcohol/Spirit Filled Type:

1. 9" long phenolic case, steel stem, accuracy of 1% full scale. Adjustable elbow joint with locking device to allow rotation of thermometer to any angle.

2. Select thermometer for appropriate temperature range.

3. Stem lengths as required for application with minimum insertion of 3-1/2".

4. Thermometers for water, steam, or oil shall have brass or steel separable socket. Wells shall extend through insulation.

5. Acceptable Manufacturer: Marsh, Miljoco, Trerice, Weiss, Weksler, Wika, or equivalent.

B. Select scales to cover expected range of temperatures.

END OF SECTION 220900

SECTION 221000 - PLUMBING PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Water Piping System

PART 2 - PRODUCTS

2.1 PIPING

A. Domestic and non-potable water:

1. Utilize Type L hard drawn seamless copper for all piping in return air plenums.

2. Joints may be soldered, threaded, solvent weld, welded, mechanically coupled grooved

3. Consider use of AquaTherm or equivalent pipe for domestic water pipe not located in return air plenums.

4. PVC Pressure Pipe (Outside Building-Underground):

B. General Installation Requirements:

1. All non-potable outlets shall be clearly marked with a permanently affixed laminated sign with 3/8” high lettering saying “Non-Potable Water Not for Human Consumption.” Sign shall have black lettering on a purple background.

C. Installation Requirements In Electrical Rooms:

1. Do not install piping or other equipment above electrical switchboards or panelboards. This includes a dedicated space extending 25 feet from the floor to the structural ceiling with width and depth equal to the equipment.

D. Valves/Fittings and Accessories:

1. Install shutoff valves that permit the isolation of equipment/fixtures in each room without isolating any other room or portion of the building. Individual fixture angle stops do not meet this requirement. Multiple restrooms shall not be tied into one shutoff valve. Exception: Back-to-back single fixture rooms in no more than two adjacent rooms.

2. Provide clearance for installation of insulation and access to valves and fittings.

3. Provide access doors for concealed valves and fittings.

4. Install valve stems upright or horizontal, not inverted.

END OF SECTION 221000

SECTION 221030 - PLUMBING SPECIALTIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Roof, Floor Drains and Floor Sinks.

B. Trap Seals and Primers.

C. Backflow Preventers.

D. Water Hammer Arresters and Air Chambers.

PART 2 - PRODUCTS

2.1 TRAP SEALS AND PRIMERS

A. Provide trap seals or trap primers for all floor drains if not receiving consistent water floor.

2.2 BACKFLOW PREVENTERS

A. Provide RPZ backflow preventer's at all incoming water supplies to buildings. Provide backflow preventers for connections to other equipment as required by code.

2.3 WATER HAMMER ARRESTERS AND AIR CHAMBERS

A. Install water hammer arresters in accessible locations. Provide access doors as required.

B. Water hammer arrestors shall be bellows type, pre-charged, all lead free stainless steel construction and installed in cold and hot water lines upstream of all plumbing fixtures or equipment, with a quick acting valve or multiple quick acting valves. Quick acting valves shall be defined as solenoid actuated valves, manual flush valves, sensor activated faucets and flush valves, squeeze handle spray faucets, and other similar type valves.

C. Install multiple water hammer arrestors in toilet group branch piping greater than 20 feet in developed length from the cold and hot water mains.

D. Install air chambers at each fixture not protected by a water hammer arrester.

E. Air chambers shall meet the requirements of the applicable plumbing code. Minimum 12” long at fixtures and minimum 24” long on risers. Air chambers shall be the same size or larger than the piping it is connected to.

2.4 ROOF DRAINS:

1. Roof drains shall have bearing pans.

2. Provide auxiliary support steel under drains as required to prevent movement of the drain. All roof drains shall have underdeck clamps.

3. Drains in built-up roofing systems shall have a 36" x 36", 3 density lead sheet flashing.

2.5 BACKFLOW PREVENTER:

1. Provide an air gap fitting and piping to drain. On 2-1/2" and larger units, install a tail piece from air gap fitting to drain to prevent water from spraying out of drain air gap receptor. Maintain air gap distance required by Code.

2. Install unit between 12” and 60" above finish floor.

2.6 FLOOR SINKS:

1. Floor sinks receiving steam condensate, or liquids exceeding 140 deg.F shall be heat rated, caulked/sealed/grouted.

2. If PVC drain pipe is used, sinks receiving liquids from 2.6.1 above to allow cooling you must run a minimum of 10’ of cast iron from the sink to include trap.

END OF SECTION 221030

SECTION 221123 - DOMESTIC WATER PUMPS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Domestic Water In-Line Circulators.

PART 2 - PRODUCTS

2.1 GENERAL

A. Statically and dynamically balance rotating parts with ECM variable speed..

B. Construction shall permit complete servicing without breaking piping or motor connections.

C. Pump connections shall be flanged, whenever available.

D. Domestic hot water pumps shall be suitable for 225ºF water.

2.2 DOMESTIC WATER IN-LINE CIRCULATORS

A. Acceptable Manufacturers: B&G (ECOCIRC Series), Taco (ECM Series), Armstrong (Astro Series), Grundfos (ALPHA Series), or equivalent

END OF SECTION 221123

SECTION 223000 - PLUMBING EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Water Heaters.

B. Water Softeners.

C. Pressure Booster System.

PART 2 - PRODUCTS

2.1 WATER HEATERS

A. Water heaters shall be electric or gas fired condensing high efficiency.

B. Acceptable Manufacturers: A.O. Smith, Bradford White, Rheem, Ruud, State, and Navien.

2.2 COMMERCIAL WATER SOFTENER

A. Acceptable Manufacturers: Culligan, Marlo, Hellenbrand, Diamond, Siemens, Watts, Sterling, Avid, or equivalent.

B. Provide double check valve backflow preventer on incoming CW service to water softeners that do not use a venturi to siphon brine.

C. Provide system start-up and subsequent service, with stocking of spare parts by authorized dealer or factory trained personnel.

2.3 PRESSURE BOOSTER SYSTEMS

A. Packaged pressure boosting system shall be completely factory assembled, run-tested, and shipped to site as an integral unit assembled on a steel skid including pumps, motors, valves, vfd's.

B. Shutoff valves with unions Flanged shall be provided on the suction and discharge of each pump. Silent spring- loaded check valves shall be installed on the discharge of each pump.

C. Pressure gauges shall be provided on the front cover of the control panel indicating system suction and discharge pressure. System shall include minimum of two vertical mounted pumps with ANSI flanged or NPT threaded connections, replaceable casing wear rings, and hydraulically balanced impellers. Pumps shall

be cast iron, bronze or stainless steel fitted construction with replaceable shaft sleeves and mechanical seals suitable for 175 psig working pressure.

D. Provide and mount on the system skid one VFDs suitable for variable torque applications.

E. Provide a high limit pressure switch compatible with the system controls, temperature, and pressure requirements. The pressure switch shall be mounted and wired on the control panel, with sensing line connected to the system discharge manifold. The high limit pressure switch shall shut down the system if the system pressure is in excess of 30 psi above the normal operating pressure.

F. Provide a pressure sensor/transmitter, shipped loose for field installation that provides a modulating output compatible with the system controls. The pressure sensor/transmitter shall be used to control booster pump VFDs to maintain a constant system pressure.

G. Use of a single pressure sensor/transmitter to control system pressure and high limit pressure cutoff is not acceptable. Both the high limit pressure switch and the pressure sensor/transmitter shall be separately wired back to the booster pump control panel.

H. The controller shall be capable of outputting system pressure and a general alarm signal to the building automation system.

I. Non-mercury low pressure control to stop pump operation if incoming water pressure drops to atmospheric.

J. Provide startup by factory authorized start-up technician.

K. Mount pressure sensor/transmitter used to control pressure booster pump VFDs remote from booster pump skid near the most remote critical plumbing fixture as indicated on the drawings, and wire signal directly back to pressure booster control panel. Pressure sensor/transmitter signal shall not interface with or be transmitted across any building information system network. Provide signal amplifiers or repeaters as required to ensure proper control operation.

L. Acceptable Manufacturers: Bell & Gossett, Canariis, Grundfos, Metropolitan, SyncroFlo, VC Systems, or approved equivalent.

END OF SECTION 223000

SECTION 224000 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Plumbing fixtures.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Wall Hung Fixture Carriers:

1. Acceptable Manufacturers: Zurn, Smith, Wade, Josam, Watts, Mifab, or equivalent.

2. Water closet carrier shall be rated to support 500 lbs. unless noted otherwise on the drawings.

B. All china shall be from the same manufacturer where possible.

C. All lavatory and sink trim shall be from the same manufacturer where possible.

D. All fixtures shall be lead free. Faucets, traps, stops, and other fixture accessories shall not contain more lead than allowed per the latest State or Federal Act.

E. Backflow Preventor:

1. Acceptable Manufacturers: Watts, Wilkins, Conbraco, or equivalent.

F. Water Closet:

1. Acceptable Manufacturers: Kohler, American Standard, Toto, Zurn, or equivalent.

G. Water Closet Flush Valves:

1. Public water closets shall be sensor activated and hard wired.

2. Acceptable Manufacturers: AMTC, Sloan, Zurn, or equivalent.

H. Urinals:

1. Acceptable Manufacturers: AMTC, American Standard, Kohler, Toto, Zurn, or equivalent.

I. Urinal Flush Valves:

1. Public urinals shall be sensor activated and hard wired.

2. Acceptable Manufacturers: AMTC, Sloan, Zurn, or equivalent.

J. Electric Water Cooler:

1. Provide with unit mounted sensor operated bottle filling station with integral drain, automatic shutoff and bottle counter.

2. Acceptable Manufacturers: Elkay, Halsey Tayler, Acorn, or equivalent.

K. Lavatory:

1. All handicapped accessible lavatory traps, piping and angle stops shall be installed with an insulating kit specially manufactured for this installation. Armaflex with duct tape is not acceptable

2. Hard-wired faucets for new construction, verify with owner for renovations.

3. Acceptable Manufacturers: Kohler, American Standard, Toto, Zurn, or equivalent.

L. Faucets:

1. Public lavatories shall be sensor activated with single-hole conventional spout.

2. Acceptable Manufacturers: AMTC, Delta, Chicago, American Standard, Moen, Zurn, or equivalent.

M. Sinks:

1. General hand washing and breakroom sinks shall be self - rimming and ADA compliant.

2. Acceptable Manufacturers: Elkay, Just, or equivalent.

N. Garbage Disposal:

1. Acceptable Manufacturers: In-Sink-Erator, Sinkmaster, Waste King, or equivalent.

O. Shower Valves:

1. Acceptable Manufacturers: Symmons, American Standard, Leonard, Powers, or equivalent.

P. Mop Basins:

1. Mop basins shall be floor level type molded stone, white with black accents.

Standard size shall be 24”x24” with vinyl bumper guard on exposed sides.

2. Acceptable Manufacturers: Fiat, Williams, Swan, Zurn, or equivalent.

Q. Mop Basin Trim:

1. Polished chrome plated finish, single wing handles, 1/4 turn, 3/4” hose thread spout with integral vacuu breaker, wall brace, pail hooks, check stops.

2. Acceptable Manufacturers: Delta, American Standard, Moen, Zurn, or equivalent.

R. Frost Free Hydrants:

1. Provide freezless hose bibbs or hydrants at roof or penthouse for servicing equipment.

2. Acceptable Manufacturers: Woodford, Wade, Zurn, or equivalent.

S. Sump and Sewage Pumps:

1. Acceptable Manufacturers: Weil, Zoeller, Goulds, or equivalent.

END OF SECTION 224000

HEATING, VENTILATING & AIR CONDITIONING [23 ## ##]
VARIABLE FREQUENCY DRIVES

PART 1 - GENERAL

1.01 DESCRIPTION

A. This specification is to cover a complete Variable Frequency Drive (VFD) consisting of a pulse width modulated (PWM) inverter designed for use with both asynchronous and permanent magnet motors.

B. The drive manufacturer shall supply the drive and all necessary options as specified. All drives installed on this project shall be from the same manufacturer and have a common user interface (control panel). The manufacturer shall have been engaged in the production of this type of equipment for a minimum of 30 years. Drives that are manufactured by a third party and "brand labeled" shall not be acceptable. Drive manufacturers who do not build their own power boards and assemblies, or do not have full control of the power board manufacturing and quality control, shall be considered as a "brand labeled" drive.

1.02 QUALITY ASSURANCE

A. Referenced Standards and Guidelines:
   1. Institute of Electrical and Electronic Engineers (IEEE)
      a. IEEE 519-2014, IEEE Recommended Practice and Requirements for Harmonic Control in Electric Power Systems
   2. Underwriters Laboratories (as appropriate)
      a. UL 508, 508A, 508C
      b. UL 61800, 61800-5-1, 61800-5-2
      c. UL 1995
   3. The Association of Electrical Equipment and Medical Imaging Manufacturers (NEMA)
      a. NEMA ICS 7-2014, Adjustable Speed Drives
   4. International Electrotechnical Commission (IEC)
      a. EN/IEC 61800
   5. National Electric Code (NEC)
      a. NEC 430.120, Adjustable-Speed Drive Systems
   6. CSA Group
      a. CSA C22.2 No. 274
   7. International Building Code (IBC)
      a. IBC 2018 Seismic – referencing ASCE 7-16 and ICC AC-156

B. Qualifications:
   1. Drives shall be UL labeled as a complete assembly. The base VFD shall be UL listed for 100 kA SCCR when installed in accordance with the manufacturer's guidelines.
   2. CE Mark – The base drive shall conform to the European Union Electromagnetic Compatibility directive, a requirement for CE marking. The base drive shall meet product standard EN 61800-3 for the First Environment restricted distribution (Category C2).
   3. The base drive shall be seismically certified and labeled as such in accordance with the 2018 International Building Code (IBC):
      a. Seismic importance factor of 1.5, and minimum 2.5 S_{DS} rating is required.
      b. Ratings shall be based upon actual shake test data as defined by ICC AC-156, via all three axis of motion.
      c. Seismic certification of equipment and components shall be provided by OSHPD preapproval.
   4. The base drive shall be SEMI-F47 certified. The drive must tolerate voltage sags to 50% for up to 0.2 seconds, sags to 70% for up to 0.5 seconds, and sags to 80% for up to one second.

5. Acceptable Manufacturers
    a. ABB ACH580 Series.
    b. Dan Foss
    c. Toshiba
    d. Alternate manufacturer's requests shall be submitted in writing to the Engineer for approval at least 20 working days prior to bid. Approval does not relieve the supplier of specification requirements.

1.03 SUBMITTALS

A. Submittals shall include the following information:
    1. Outline dimensions, conduit entry locations and weights.
    2. Customer connection and power wiring diagrams.
    3. OSHPD preapproval, seismic certification and installation requirements where applicable.
    4. Complete technical product description with complete list of options provided. Any portions of this specification not met must be clearly indicated or the supplier and contractor shall be liable to provide all additional components required to meet this specification.
    5. Building Information Modeling (BIM) objects shall be available online.

PART 2 - PRODUCTS

2.01 VARIABLE FREQUENCY DRIVES

A. The drive package as specified herein shall be enclosed in a UL Type enclosure (enclosures with only NEMA ratings are not acceptable), completely assembled and tested by the manufacturer to ISO9001 standards.
B. The drives shall not be factory installed on the driven equipment such as an air handler, pump or pump skid.
C. Drives shall not be installed in Motor Control Center or switch gear.
D. All drives shall be supplied by 1 manufacturers representative.
E. The drive shall provide full rated output from a line of +10% to -15% of nominal voltage. The drive shall continue to operate without faulting from a line of +25% to -35% of nominal voltage.
    1. Drives shall be capable of continuous full load operation under the following environmental operating conditions:
        a. Ambient temperature -15 to 40° C (5 to 104° F).
        b. Altitude 0 to 1000 m (0 to 3,300 ft) above sea level.
        c. Humidity 5 to 95%, non-condensing.
F. All drives shall utilize the same Advanced Control Panel (keypad) user interface.
    1. Plain English text
        a. The display shall be in complete English words for programming and fault diagnostics (alpha-numeric codes are not acceptable).
        b. Safety interlock and run permissive status shall be displayed using predetermined application specific nomenclature, such as: Damper end switch, smoke alarm, vibration trip, and overpressure.
        c. Safety interlock, run permissive, and external fault status shall have the option of additional customized project specific terms, such as: AHU-1 End Switch, Office Smoke Alarm, CT-2 Vibration.
    2. The control panel shall include at minimum the followings controls:
        a. Four navigation keys (Up, Down, Left, Right) and two soft keys to simplify operation and programming.
        b. Hand-Off-Auto selections and manual speed control without having to navigate to a parameter.
        c. Fault Reset and Help keys. The Help key shall include assistance for programming and troubleshooting.

3. Multiple Home View screens shall be capable of displaying up to 21 points of information. Customizable modules shall include bar charts, graphs, meters, and data lists. Displays shall provide real time graphical trending of output power, frequency, and current within selectable intervals of 15/30/60 minutes and 24 hours.
4. The control panel shall display the following items on a single screen; output frequency, output current, reference signal, drive name, time, and operating mode (Hand vs Auto, Run vs Stop). Bi-color (red/green) status LED shall be included. Drive (equipment) name shall be customizable.
5. There shall be a built-in time clock in the control panel. The clock shall have a battery backup with 10 years minimum life span. Daylight savings time shall be selectable.
6. I/O Summary display with a single screen shall indicate and provide:
    a. The status/values of all analog inputs, analog outputs, digital inputs, and relay outputs. Drives that require access to internal or live components to measure these values, are not acceptable.
    b. The programmed function of all analog inputs, analog outputs, digital inputs, and relay outputs.
    c. The ability to force individual digital I/O high or low and individual analog I/O to desired value, for increased personal protection during drive commissioning and troubleshooting. Drives that require access to internal or live components to perform these functions, are not acceptable.
7. The drive shall automatically backup parameters to the control panel. In addition to the automatic backup, the drive shall allow two additional unique backup parameter sets to be stored. Backup files shall include a time and date stamp. In the event of a drive failure, the control panel of the original drive can be installed on the replacement drive, and parameters from that control panel can be downloaded into the replacement drive.
8. The control panel shall display local technical support contact information as part of drive fault status.
9. The control panel shall be removable, capable of remote mounting.
10. The control panel shall have the ability to store screen shots, which are downloadable via USB.
11. The control panel shall have the ability to display a QR code for quick access to drive information.
12. The LCD screen shall be backlit with the ability to adjust the screen brightness and contrast, with inverted contrast mode. A user-selectable timer shall dim the display and save power when not in use.
13. The control panel shall include assistants specifically designed to facilitate start-up. Assistants shall include: First Start Assistant, Basic Operation, Basic Control, and PID Assistant.
14. Primary settings for HVAC shall provide quick set-up of all parameters and customer interfaces to reduce programming time.
15. The drive shall be able to operate with the control panel removed.
16. The drive shall be able to support a Bluetooth Advanced Control Panel. The Bluetooth control panel shall be FCC and QDL (Qualified Design Listing) certified.
    a. A free app (iOS and Android) shall replicate the control panel on a mobile device or tablet. The control panel's programming and control functionality shall function on the device. Customizing text, such as AHU-1 End Switch, shall be supported by the device's keyboard.
    b. Bluetooth connectivity shall allow uploading, downloading, and emailing of parameter sets.
    c. Bluetooth connectivity shall include two pairing modes: Always discoverable with a fixed passcode, and manual discovery with a unique generated passcode every pairing.
    d. The Bluetooth antenna shall be in the control panel. Antennas that are integrated in the drive's control board, must include an external antenna, on all drives mounted inside cabinets.
    e. Bluetooth connectivity shall be capable of being switched off.

G. All drives shall have the following hardware features/characteristics as standard:

1. Two (2) programmable analog inputs shall accept current or voltage signals. Current or Voltage selection configured via control panel. Drives that require access to internal components to perform these functions, are not acceptable.
2. Two (2) programmable analog outputs. At least one of the analog outputs shall be adjustable for current or voltage signal, configured via control panel. Drives that require access to internal components to perform these functions, are not acceptable.
3. Six (6) programmable digital inputs. All digital inputs shall be programmable to support both active high and active low logic, and shall include adjustable on/off time delays. The digital input shall be capable of accepting both 24 VDC and 24 VAC.
4. Three (3) programmable Form-C relay outputs. The relay outputs shall include programmable on/off time delays. The relays shall be rated for a continuous current rating of 2 Amps. Maximum switching voltage of 250 VAC / 30 VDC. Open collector and Form-A relays are not acceptable. Drives that have less than (3) Form-C relay outputs shall provide an option card to provide additional relay outputs.
5. Drive terminal blocks shall be color coded for easy identification of function.
6. The drive shall include an isolated USB port for interface between the drive and a laptop. A non-isolated USB port is not acceptable.
7. An auxiliary power supply rated at 24 VDC, 250 mA shall be included.
8. At a minimum, the drives shall have internal impedance equivalent to 5% to reduce the harmonics to the power line. 5% impedance may be from dual (positive and negative DC link) chokes, or AC line reactor. Drives with only one DC link choke shall add an AC line choke integral to the drive enclosure. Reference the drive schedule to determine if additional harmonic mitigation is required for the system to comply with IEEE 519-2014.
9. The drive shall have cooling fans that are designed for field replacement. The primary cooling fan shall operate only when required and be variable speed for increased longevity and lower noise levels. Drives whose primary cooling fans are not variable speed, shall include a spare cooling fan.
10. The overload rating of the drive shall be 110% of its normal duty current rating for 1 minute every 10 minutes, 130% overload for 2 seconds every minute. The minimum current rating shall meet or exceed the values in the NEC/UL table 430.250 for 4-pole motors.
11. The input current rating of the drive shall not be greater than the output current rating. Per NFPA 70 430.122, drives with higher input current ratings may require the upstream wiring, protection devices, and source transformers to be upsized.
12. Circuit boards shall be coated per IEC 60721-3-3; Chemical gasses Class 3C2 and Solid particles Class 3S2.
13. Earth (ground) fault detection shall function in both modulating (running) and non-modulating modes.
14. Coordinated AC transient surge protection system consisting of 4 MOVs (phase-to-phase and phase-to-ground), a capacitor clamp, and internal chokes. The MOVs shall comply with UL 1449 4th Edition. Drives that do not include coordinated AC transient surge protection shall include an external TVSS/SPD (Transient Voltage Surge Suppressor/Surge Protection Device).
15. The drive shall include a robust DC bus to provide short term power-loss ride through. The DC bus Joule to drive kVA ratio shall be 4.5 J/kVA or higher. An inertia-based ride through function should help maintain the DC bus voltage during power loss events. Drives with control power ride through only, are not acceptable.

H. All drives shall have the following software features as standard:
1. A Fault Logger that stores the last 16 faults in non-volatile memory.
   a. The most recent 5 faults save at least 9 data points, including but not limited to: Time/date, frequency, DC bus voltage, motor current, DI status, temperature, and status words.
   b. The date and time of each fault and fault reset attempt shall be stored in the Fault Logger.
2. An Event Logger that stores the last 16 warnings or events that occurred, in non-volatile memory.

a. Events shall include, but not limited to: Warning messages, checksum mismatch, run permissive open, start interlock open, and automatic reset of a fault.
b. The date and time of each event's start and completion points shall be stored in the Event Logger.

3. Programmable start method. Start method shall be selectable based on the application: Flying-start, Normal-start, and Brake-on-start.
4. Programmable loss-of-load (broken belt / coupling) indication. Indication shall be selectable as a control panel warning, relay output, or over network communications. This function to include a programmable time delay to eliminate false loss-of-load indications.
5. Motor heating function to prevent condensation build up in the motor. Motor heating adjustment, via parameter, shall be in "Watts." Heating functions based only on "percent current" are not acceptable.
6. Advanced power metering abilities shall be included in the drive. Drives without these data points, must include a separate power meter with each drive.
   a. Instantaneous output power (kW)
   b. Total power, broken down by kWh, MWh, and GWh units of measurement. Power meters that only display kWh and roll over or "max out" once the maximum kWh value is reached, are not acceptable. There shall be resettable and non-resettable total power meters within the drive.
   c. Time based kWh metering for: current hour, previous hour, current day, and previous day.
   d. Energy saving calculation shall be included that shows the energy and dollars saved by the drive.
7. The drive shall include a motor flux optimization circuit that will automatically reduce applied motor voltage to the motor to optimize energy consumption and reduce audible motor noise.
8. Run permissive circuit - There shall be a run permissive circuit for damper or valve control. Regardless of the source of a run command, the Drives shall provide a dry contact closure that will signal the damper to open. When the damper is fully open, an end-switch shall close, allowing the drive to run the motor.
   a. The drive shall also include a programmable start delay, for when an end-switch is not provided.
9. Start interlock circuit - Four separate start interlock (safety) inputs shall be provided. When any safety is opened, the motor shall be commanded to stop. The control panel will display the specific safety(s) that are open. The status of each safety shall be transmitted over the network communications. Wiring multiple safeties in series is not acceptable.
10. External fault circuit – Three separate external fault inputs shall be provided. This circuit shall have the same features and functionality as the start interlock circuit, except it shall require a manual reset before the drive is allowed to operate the motor.
11. The drive shall include a switching frequency control circuit that reduces the switching frequency based on actual drive temperature, and allows higher switching frequency settings without derating the drive. It shall be possible to set a minimum and a target switching frequency.
12. Visual function block adaptive programming allowing custom control schemes, minimizing the need for external controllers. I.e. cooling tower staging logic. A free software tool shall be used to configure adaptive programming.
13. The ability to automatically restart after an over-current, over-voltage, under-voltage, external fault, or loss of input signal protective trip. The number of restart attempts, trial time, and time between attempts shall be programmable. Each of these faults may have automatic restart individually disabled via a parameter selection.
14. Three (3) programmable critical frequency lockout ranges to prevent the drive from operating the load continuously at an unstable speed/load.
15. Seven (7) programmable preset frequencies/speeds.
16. Two independently adjustable accel and decel ramps with 1 – 1800 seconds adjustable time ramps.

17. PID functionality shall be included in the drive.
    a. Programmable "Sleep" and "Wake up" functions to allow the drive to be started and stopped based on the level of a process feedback signal.
    b. The drive shall include an independent PID loop for customer use, assigned to an Analog Output. This PID loop may be used for cooling tower bypass valve control, chilled water valve, etc.
18. At least 4 parameter user sets that can be saved to the permanent memory and recalled using a digital input, timed function, or supervision function.
19. Drive shall be compatible with an accessory that allows the control board to be powered from an external 24 VDC/VAC source, allowing the drive control to remain powered by a UPS during an extended power outage.
20. A computer-based software tool shall be available to allow a laptop to program the drive. The drive shall be able to support programming without the need for line voltage. All necessary power shall be sourced via the laptop USB port.
21. The drive shall include a fireman's override mode. Upon receipt of a contact closure from the Fire Alarm Life Safety system, the drive shall operate in a dedicated Override mode distinct and separate from the drive's Normal operation mode. The following features will be available in the drive override function:
    a. The Override mode shall be secured by password to prevent changes once programmed.
    b. The drive shall ignore external inputs and commands not defined as part of the override function.
    c. Override operation mode shall be selectable between: single frequency, multiple fixed frequencies, follow an analog input signal, PID control, or come to a forced stop.
    d. High priority safeties shall stop the drive and lower priority safeties shall be ignored in Override mode.
    e. Drive faults shall be defined in Critical and Low priority groups. Critical faults shall stop the drive. Low priority faults shall be reset. Reset trials and timing shall be programmable.
    f. The drive shall be configurable to receive from 1 to 3 discrete digital input signals and operate at up to three discrete speeds.
22. The drive shall have multi-pump functionality and an intelligent master/follower configuration for controlling up to 8 parallel pumps equipped with drives. The drive shall have a parameter synchronization feature to program the PID, multi-pump, and AI parameters in all parallel drives. The functionality to start and stop the pumps based on capacity, operating time or efficiency of the pump to ensure each pump is operated regularly.
    a. The multi-pump functionality shall control:
        1) Flow Control
        2) Pressure Control
        3) Pump Alternation

l. Security Features
1. The drive manufacture shall clearly define cybersecurity capabilities for their products.
2. The drive shall include password protection against parameter changes.
    a. There shall be multiple levels of password protection including: End User, Service, Advanced, and Override.
    b. The drive shall support a customer generated unique password between 0 and 99,999,999.
    c. The drive shall log an event whenever the drive password has been entered.
    d. The drive shall provide a security selection that prevents any "back door" entry. This selection even prevents the drive manufacturer from being able to bypass the security of that drive.
    e. A security level shall be available that prevents the drive from being flashed with new firmware.
3. A checksum feature shall be used to notify the owner of unauthorized parameter changes made to the drive. The checksum feature includes two unique values assigned to a specific programming configuration.

a. One checksum value shall represent all user editable parameters in the drive except communication setup parameters. A second checksum value shall represent all user editable parameters except communication setup, energy, and motor data parameters.
b. Once the drive has been commissioned the two values can be independently saved in the drive.
c. The drive shall be configurable to either: Log an Event, provide a Warning, or Fault upon a parameter change when the current checksum value does not equal the saved checksum value.

4. The "Hand" and "Off" control panel buttons shall have the option to be individually disabled (via parameter) for drives mounted in public areas.
5. The capability to disable Bluetooth on control panels that include Bluetooth functionality shall be provided.

J. Network Communications
1. The drive shall have an EIA-485 port with removable terminal blocks. The onboard protocols shall be BACnet MS/TP, Modbus, and Johnson Controls N2. Optional communication cards for BACnet/IP, LonWorks, Profibus, Profinet, EtherNet/IP, Modbus TCP, and DeviceNet shall be available. The use of third party gateways are not acceptable.
2. The drive shall have the ability to communicate via two protocols at the same time, one onboard protocol and one option card based protocol. Once installed, the drive shall automatically recognize any optional communication cards without the need for additional programming.
3. The drive shall not require a power cycle after communication parameters have been updated.
4. The embedded BACnet connection shall be a MS/TP interface. The drive shall be BTL Listed to Revision 14 or later. Use of non-BTL Listed drives are not acceptable.
5. The drive shall be classified as an Applications Specific Controller (B-ASC). The interface shall support all BIBBs defined by the BACnet standard profile for a B-ASC including, but not limited to:
a. Data Sharing: Read Property Multiple-B, Write Property Multiple-B, COV-B
b. Device Management: Time Synchronization-B
c. Object Type Support: MSV, Loop
6. The drive's relay output status, digital input status, analog input/output values, Hand-Auto status, warning and fault information shall be capable of being monitored over the network. The drive's start/stop command, speed reference command, relay outputs and analog outputs shall be capable of being controlled over the network. Remote drive fault reset shall be possible.

K. Disconnect – A circuit breaker or disconnect switch shall be provided when indicated on the drive schedule. The disconnect shall be door interlocked and padlockable. Drive input fusing shall be included on all packaged units that include a disconnecting means. All disconnect configurations shall be UL Listed by the drive manufacturer as a complete assembly and carry a UL508 label. Disconnect packages manufactured by anyone other than the drive manufacturer, are not acceptable.

L. Bypass – Bypass drive packages shall be provided when indicated on the drive schedule. All drive/bypass configurations shall be UL Listed by the drive manufacturer as a complete assembly and carry a UL508 label. Bypasses manufactured by anyone other than the drive manufacturer, are not acceptable.
1. The drive and bypass package shall be a complete factory wired and tested bypass system consisting of a padlockable disconnect device, drive output contactor, bypass contactor, and drive input fuses.
2. The drive and bypass package shall have a UL listed short circuit current rating of 100 kA, for 240 VAC and 480 VAC systems, and this rating shall be indicated on the rating label.
3. The bypass control shall be powered by a three-phase switch mode power supply with a voltage tolerance of +30%, -35%. Single-phase power supplies and control power transformers (CPT) are not acceptable.

4. The drive and bypass package shall be seismic certified and labeled to the IBC. Seismic importance factor of 1.5 rating is required, and shall be based upon actual shake table test data as defined by ICC AC-156. Seismic certification of equipment and components shall be provided by OSHPD preapproval.
5. All bypass packages shall utilize a dedicated LCD bypass control panel (keypad) user interface. The bypass control panel must be a separate display from the drive control panel. Bypass packages that use a single shared drive/bypass control panel are not acceptable, due to that control panel acting as a single point of failure.
    a. The bypass shall include a two-line, 20-character LCD display. The display shall allow the user to access parameters and view:
        1) Bypass input voltage, current (Amps) and power (kW)
        2) Bypass faults, warnings, and fault logs
        3) Bypass operating time and energy consumption (resettable)
    b. The bypass control panel shall include the following controls:
        1) Four navigation keys (Up, Down, Enter, Escape)
        2) Bypass Hand-Off-Auto, Drive mode / Bypass mode selectors, Bypass fault reset
    c. The following indicating lights (LED PTT type) or control panel display indications shall be provided.
        1) Drive mode selected, Bypass mode selected
        2) Drive running, Bypass running
        3) Drive fault, Bypass fault
    d. Safety interlock and run permissive status shall be displayed using predetermined application specific nomenclature, such as: Damper end switch, smoke alarm, vibration trip, and overpressure.
6. All bypasses shall have the following hardware features/characteristics as standard:
    a. Six (6) digital inputs and five (5) Form-C relay outputs. The digital inputs shall be capable of accepting both 24 VDC and 24 VAC. The bypass control board shall include an auxiliary power supply rated 24 VDC, 250 mA.
    b. Drive isolation fuses shall be provided. Bypass designs which have no such fuses, or that only incorporate fuses common to both the drive and the bypass are not acceptable. Third contactor “isolation contactors” and service switches are not an acceptable alternative to drive isolation fuses.
    c. The bypass shall be able to detect a single-phase input power condition while running in bypass, disengage the motor, and provide a single-phase input power indication.
    d. The bypass shall be designed for stand-alone operation and be completely functional in both Hand and Automatic modes, even if the drive and/or drive’s control board has failed. Network communications shall remain functional. Bypass systems that do not maintain full functionality in the event of a drive failure, are not acceptable.
7. All bypasses shall have the following software features as standard:
    a. Programmable loss-of-load (broken belt / coupling) indication shall be functional in drive and bypass mode.
    b. The bypass shall also support run permissive and start interlock control functionality, including start delay, as previously specified in the drive section.
    c. The bypass control shall monitor the status of the drive and bypass contactors and indicate when there is a welded contactor contact or open contactor coil.
    d. The bypass shall include a selection for either manual or automatic transfer to bypass. The automatic transfer mode shall allow the user to select the specific drive fault types that result in an automatic transfer to bypass. The automatic transfer mode shall not allow a transfer to bypass on motor related faults. Automatic transfer schemes that do not differentiate between fault types, are not acceptable.
    e. The bypass shall include the ability to select the operating mode of the system (Drive/Bypass) from either the bypass control panel or digital input.

f. The bypass shall include a supervisory control mode that monitors the value of the drive's analog input (feedback). This feedback value is used to control the bypass contactor on/off state. The supervisory mode shall allow the user to maintain hysteresis control over applications such as cooling towers and booster pumps.
g. Selectable Class 10, 20, or 30 electronic motor overload protection shall be included in both drive and bypass mode.
h. The drive and bypass shall be designed to operate as an integrated system when in Override mode. Whether operating in drive or bypass mode, the low priority safeties will be ignored, and high priority safeties will be followed. External start/stop commands will be ignored. There shall be four selectable Override modes:
    1) Bypass only, with two smoke control modes:
        a) Fixed pre-configuration of digital inputs
        b) Configurable high/low priority safeties and faults, to allow configuration to meet needs of local Authority Having Jurisdiction.
    2) Drive only
    3) Drive then transfer to bypass, in the event of a drive fault
    4) Force to Stop

8. Network communications – the bypass shall include BACnet MS/TP, Modbus, and Johnson Controls N2 as standard. The bypass BACnet implementation shall be BTL Listed to Revision 14 or later. Optional communication cards for BACnet/IP, LonWorks, Profibus, Profinet, Ethernet/IP, Modbus TCP, and DeviceNet shall be available.
    a. The bypass relay output status, digital input status, warning and fault information can be monitored over the network. Status information shall be monitored, including; operating mode (drive vs bypass), current drawn in bypass mode, broken belt, and phase-to-phase voltage. The bypass start/stop command, force to bypass command, and relay outputs shall be capable of being controlled over the network.

PART 3 - EXECUTION

3.01 INSTALLATION

A. The responsible party shall install the drive in accordance with the recommendations of the drive manufacturer as outlined in the drive installation manual.
B. Power wiring shall be completed by the responsible party. All wiring shall be installed in accordance with the recommendations of the drive manufacturer as outlined in the installation manual.
C. Installation shall be in accordance with national, state and local building and electrical codes as may be in force in the installation area.

3.02 START-UP

A. Start-up shall be provided for each drive by an authorized local service provider.

3.03 PRODUCT SUPPORT

A. Factory trained application engineering and service personnel that are thoroughly familiar with the drive products offered shall be locally available at both the specifying and installation locations. A toll free 24/365 technical support line connected to factory support personnel located in the US and Canada shall be available.
B. Training shall include installation, programming and operation of the drive, bypass and network communications. Owner training shall be provided locally upon request.
C. VFD supplier shall have local inventory withing 30 miles of the jobsite.

3.04 WARRANTY

A. The drive Product Warranty shall be 30 months from the date of shipment from the factory. The warranty shall include: Parts, on-site labor, and travel time and travel costs, or replacement of the complete drive as determined by the drive manufacturer's technical support.

END OF SECTION

Metasys System Division 23 Guide Specification (Abbreviated)

Building Technologies & Solutions
www.johnsoncontrols.com
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Johnson Controls—CONFIDENTIAL

Metasys System Division 23 Guide Specification (Abbreviated)

Last Revision Date: 49/2627//21 (C. DudleyJ. Allen)
CSI Format: CSI MasterFormat (2004) – Note: we do not issue a CSI Division15 format
Aligns with Metasys: Metasys 11.0

Instructions

Please Note: **This document is NOT for direct distribution to consultants or customers**. You should not simply give or transmit the document, as is, to your customers. This document is meant to be a tool to assist in writing, editing and reviewing customers' and consultants' specifications. The navigation and outline structure have been set up to allow our BSNA sales people to "cut and paste" appropriate paragraphs and sentences from this document into the customers' specification documents, and to highlight Metasys features and capabilities which will bring long term value to our customers.

Contact your PDNA account manager for assistance and/or if you have questions; an updated chart with the contact information can be found at PDNA Account Manager by Area.

Overview

Division 23 09 23, Direct Digital Control Systems for HVAC/Building Management System, is the core section around BAS and the Metasys products. This part of the Guide Spec document has been updated to include language that covers the capabilities of new Metasys products and new features that have been added over the past several revisions to the Metasys product line, up to and including Metasys 11.0.

Key areas of interest include Metasys BACnet updates, cybersecurity, MAP, Metasys wireless products, the capabilities of PVT, IP field controllers, and especially the Metasys User Interface.

The following document contains many "fields" that require selection or editing. Most commonly, these "fields" are identified with yellow highlighting and special "Note:" text.

Example:

> Note: Item b. is optional, edit as required.

It is highly recommended that you have the Navigation pane open for quick and easy navigation to key sections of interest.

Please Note: We are still reviewing and revising Div 23 09 13, Instrumentation and Control Devices for HVAC, the section of the spec around the input/output devices and peripherals. Likewise, there will be further updates and revisions to Div 23 09 93, Sequences of Operations for HVAC Controls.

Notes Specific To This Abbreviated Version

This specification has been edited from the Metasys Release 11 Division 23 master specifications which, if un-edited, are 105 pages long. This version is 58 total pages (20 for field devices – division 23 09 13, and 33 for the BMS – division 23 09 23). The goal is to have a useful, shortened document to provide to owners and engineers that is easier to review and "digest" for conventional projects. These specifications provide for the following:

- A fully networked Building Management System:
  - Specs for all field devices – Division 23 09 13
    - Characterized ball valves (no 6-way, globe, or PIC valves remain in specs)
  - All wired system (no wireless products specified)
  - Data drops to engines and server by Owner, originating at Owner's IT network
  - All Generation 4 engines and field controllers are specified
  - Software features through Release 11 are specified
  - Prompts for various areas within the spec that require further review and editing
- Spec "slowers" to hinder competition (Indicated in green hi-lited text):
  - Independent BAS distributors must pre-submit for acceptance prior to being listed, including a guarantee letter from the manufacturer assuring project completion
  - Temporary wireless communication to the Ethernet network (Connected Workflow Engines)

- User interface features including full MUI functionality, including fault detection and triage
- All latest features of our Gen 4 engines and field controllers including secure boot, background download, timeclocks in field controllers, PRAC, integral displays on SNCs, integral actuator potentiometers on CVMs (as needed), etc.
- Latest NS zone sensors with up to 4 sensing points under one cover
- All system programming tools to be provided to Owner
- PVT reports to be run and provided during specified phases of project completion

- Spec "stoppers" to stop our competitors from ignoring or short-cutting certain spec sections (indicated in light blue hi-lited text):
  - Certain sections are listed to be furnished or provided "without exception" or alternatives are called for in lieu of the specified product/functionality, etc…

Changes made from the Master Specifications:

Division 23 09 13 Tier 4 Field Device changes:

- 6-way ball valve specs deleted
- Globe valve specs deleted
- Pressure independent ball and globe valve specs deleted

Division 23 09 23 Building Management System specs changes:

- Item 1.B Definitions deleted
- Some deletions to Workplace Safety and Hazardous Materials section
- References to smoke control deleted
- Extensive edits to Site Management Portal and Associated Application Components section (ie. Eliminating SMP functionality with MUI being the primary user interface to the system)
- Mobile Access Portal specs deleted
- SNE User interface specs condensed
- SNE sizing specs condensed
- NAE8500 specs deleted
- SNC application support section deleted
- Optional server reporting packages (Advanced Reporting and Energy Essentials) was deleted
- SNC application support section deleted
- Edits to CVM specs
- Specs for Generation 3 FACs, FECs, AVMAs, VMAs and IOMs were deleted
- Specs for NS series discharge air and standalone CO2 sensors were deleted
- Specs for VAV balancing sensor and wireless diagnostic tool were deleted
- Specs for VFDs were deleted
- Specs for VRF Smart Gateway were deleted
- Construction Automation Network Added
- Temporary Cellular Connection Added
- Connected Engines Added
- Construction Installation and Commissioning Reports Added
- Connected Workflow Dashboard Added

Chip Dudley – BAS Channel Account Manager, South
(713) 376-1175
Lauren.c.dudley@jci.com

Metasys System Division 23 Guide Specification

23 09 13 Instrumentation and Control Devices for HVAC

23 09 13.13 Actuators and Operators

A. General Requirements

1. Actuators shall be electronic ~~or pneumatic, or both,~~ as detailed in the following sections.
2. The manufacturer shall be ISO 9001 certified.

B. Electronic Damper Actuators

1. Spring Return Actuators:

c. Spring Return Actuators shall be manufactured, brand labelled and distributed by Johnson Controls or an approved equivalent.

d. Spring Return Actuators shall comply with the following regulatory agency listings: cULus, CSA C22.2 No24-93, and CE marked. Asia Pacific (APAC) actuators shall be excluded from this regulatory information.

e. Spring Return Actuators shall be of direct-coupled design and require no crank arm or linkage for mounting to a shaft.

f. Spring Return Actuators shall offer a coupling method which requires a toothed V-bolt clamp and nuts with toothed cradle.

g. Spring Return Actuators shall be configured for reversible mounting which provides either clockwise or counter clockwise operation.

h. Spring Return Actuators power failure operation shall configure upon a loss of electric power to the actuator, a mechanical spring return system shall drive the actuator to the failsafe home position. Other forms of internal energy storage for power failure operation shall not be acceptable.

i. Spring Return Actuators shall utilize the following motor technology:

i. Modulating types: Microprocessor-controlled brushless DC motors

ii. On/Off types: DC brush motor

j. Spring Return Actuators shall be furnished with Electronic Stall Detection which protects the actuator from overload at all angles of rotation without the need for end switches.

k. Spring Return Actuators shall comply with enclosure ratings of NEMA type 2 or IP54 mounted in any orientation.

l. Spring Return Actuators shall eliminate the need for electrical ground wires for double-insulated construction.

m. Spring Return Actuators shall be furnished with integral cables with colored and numbered conductors for simplified wiring.

n. Spring Return Actuators shall be sized for the torque required to seal the damper at load conditions.

o. Spring Return Actuators shall be available in parallel operation that are capable of being mechanically or electrically paralleled.

p. Proportional actuators shall be user configurable without the use of external computer software or programming tools. Calibration, input signal range selection, and control logic reversal shall be selectable with an external mode selection switch.

q. Spring Return Actuators shall operate in the following temperature ranges:

   i. For a 70 lb·in. torque actuator range must be -40°F to 140°F (-40°C to 60°C)

   ii. For a 177 lb·in. torque actuator range must be -40°F to 131°F (-40°C to 55°C)

r. Spring Return Actuators shall be provided with the following power requirements:

   i. Modulating types:

      a) A torque of 27 lb·in. has a 6VA maximum

      b) A torque of 70 lb·in. has an 8VA maximum

      c) A torque of 177 lb·in. has a 16VA maximum

   ii. Two-position types:

      a) A torque of 27 lb·in. has a 6VA maximum

      b) A torque of 70 lb·in. has an 8VA maximum

      c) A torque of 177 lb·in. has a 25VA maximum

2. Non-Spring Return Actuators

a. Non-Spring Return (NSR) actuators shall be manufactured, brand labelled or distributed by Johnson Controls or an approved equivalent. The NSR actuators are manufactured under International Standards Organization (ISO) 9001 Quality Control Standards to ensure quality.

b. NSR actuators shall comply with the following regulatory agency listings: cULus, CSA C22.2 No 24-93, and CE marked. APAC actuators are excluded from this regulatory information.

c. NSR actuators shall be provided with a 5 year warranty from the date of sale.

   Actuators sold in the APAC region shall comply with an 18 month warranty policy.

d. NSR actuators shall be of direct-coupled design and require no crank arm or linkage for mounting to a shaft.

e. NSR actuators shall be of a design that converts the damper version to the valve version without the use of special tools.

f. NSR actuators shall be configured for direct mounting and will not require any damper linkage. Actuators can be mounted directly with a universal clamp to the following:

   i. Round damper shaft from 3/8 in. (10mm) up to 1 in. to 1/16 in. (27mm)

   ii. Square damper shaft from 3/8 in. (10mm) up to 3/4 in. (19mm)

g. NSR actuators shall feature an optional NEMA 4X/IP66 weather shield for applications in harsh environments.

h. NSR actuators shall be furnished such that the actuator complies with the following control signals:

   i. The NSR actuators shall be available in models that accept input signal controls for on/off, floating, and proportional control.

   ii. The NSR actuators shall operate with an automatic signal input detection which allows automatic recognition of input signals for on/off, floating and proportional control. They shall be equipped with adjustable span automatic controls that require no special tools.

iii. In proportional mode, the actuator shall respond to control signals DC 0 V to 10 V or DC 2 to 10 V.

iv. When a 500 ohm resistor is added in proportional mode, the actuator shall respond to a 0 mA to 20 mA or 4 to 20mA signal. A feedback signal of DC 0 V to 10 V or DC to 10 V indicates position.

i. NSR actuators shall be available in line voltage On/Off and floating models to offer reduced total installation cost by avoiding installation of external power supply adapters.

j. NSR actuators shall be available in high speed On/Off and floating models for applications in loop that require a quick response time.

k. NSR actuators shall offer optional auxiliary switches to provide the following:

i. Two line-voltage-capable single-pole, double-throw (SPDT) switches with continuously adjustable switch points

ii. An auxiliary potentiometer kit provides and potentiometer feedback options for improving the safety, interface and signal

l. NSR actuators shall be furnished with the option of backward compatible to produce a seamless retrofit without the need to replace the controller.

m. NSR actuators shall have the option to be furnished with a plenum-rated cable which are specially configured for installation in spaces used for environmental air-handling purposes, other than ducts and plenums, as specified in National Fire Protection Association (NFPA) 70: National Electrical Code section 300.22(C), Other Space Used for Environmental Air.

n. NSR actuators shall have a constant runtime which is independent of supply voltage frequency and load.

o. NSR actuators for Floating and On/Off models for line voltage (AC 85 to 264 V) for standard speed applications shall operate with AC 85 to 264 V and provide the rated torque. The actuators shall be designed to provide constant runtime, independent of supply voltage frequency and load.

p. NSR actuators for Floating and On/Off models for AC/DC 24 V for high speed applications shall have an 8-second constant runtime, independent of supply voltage frequency and load.

q. NSR actuators shall be furnished with electronic stall detection which protects the actuator from overload at all angles of rotation. The actuator may be stalled anywhere in its rotation range without the need for mechanical end switches.

r. NSR actuators shall be equipped with microprocessor-controlled brushless DC motors which provides constant runtime independent of torque and increases the actuators lifecycle by reducing water.

s. NSR Actuators shall have the option of a bottom-mounted coupler which simplifies short shaft damper applications.

t. NSR actuators shall offer multiple shaft coupling methods:

i. For units above 80 lb·in a toothed V-bolt clamp and nuts with a toothed cradled shall be used

ii. For units 80 lb·in. and below use a single-cup-point set screw and toothed cradle

shall be used

u. NSR actuators shall be furnished with a Minimum IP (ingress protection) enclosure ratings as follows:

i. Actuator for types with covered wiring terminals shall be furnished as NEMA type 2/IP42 mounted in any orientation.

ii. Actuators for types without a covered wiring terminal shall be furnished with a NEMA type 1/IP30 or IP40.

iii. Actuators for types with integrated cables shall be furnished as NEMA type 2/IP42 mounted in any orientation.

iv. NSR actuators shall be furnished with a minimum IP (ingress protection) rating of no lower than IP42, but also be available in NEMA5/IP54.

v. NSR actuators shall be able to operable in a temperature range of -4°F to 122°F (-20°C to 50°C) except for VAV and similar indoor applications in which 32°F to 122°F (0°C to 50°C) is acceptable.

w. NSR actuators shall be provided with the following power requirements:

i. 24 V with models available for both 24 VAC and 24 VDC operation (maximum)

ii. For NSR actuators above 80 lb·in. a maximum of 7.5 VA at 24 VAC

iii. For NSR actuators 80 lb·in. or below a maximum of 3.5 VA at 24 VAC

x. NSR actuators shall be sized for the torque required to seal the damper at load conditions. For NSR actuators in parallel operation, actuators shall be available that are capable of being mechanically or electrically paralleled automatically.

y. NSR proportional actuators shall be user configurable without requiring the use of external computer software or programming tools.

z. NSR actuators shall also be furnished with the option of backward compatible auxiliary switch kits and auxiliary potentiometers which allow for a seamless retrofit without the needs to replace the controller.

23 09 13.23 Sensors and Transmitters

A. General Requirements

1. Installation, testing, and calibration of all sensors, transmitters, and other input devices shall be provided to meet the system requirements. Exact OEM equivalents of specified sensors and transmitters shall be acceptable if clearly identified in submittals.

B. Temperature Sensors

1. General Requirements

a. Sensors and transmitters shall be provided, as outlined in the input/output summary and sequence of operations.

b. The temperature sensor shall be of the resistance type, and shall be either two-wire 1000 ohm nickel RTD, or two-wire 1000 ohm platinum RTD. Thermistor sensors of 10,000 or 2,250 ohms resistance may be substituted based on the application.

c. The following point types (and the accuracy of each) are required, and their associated accuracy values include errors associated with the sensor, lead wire, and A to D conversion.

Point Type	Accuracy
Chilled Water	+ .5°F
Room Temp	+ .5°F
Duct Temperature	+ .5°F
All Others	+ .75°F

2. Room Temperature Sensors
   a. Room sensors shall be constructed for either surface or wall box mounting.
   b. Room sensors shall have the following options when specified:
      i. Setpoint warmer/cooler
      ii. Individual heating/cooling setpoint
      iii. Momentary override request for activation of after-hours operation
      iv. Analog thermometer
3. Room Temperature Sensors with Integral Display
   a. Room sensors shall be constructed for either surface or wall box mounting.
   b. Room sensors shall have an integral LCD display and the following capabilities when specified:
      i. Display room air temperatures
      ii. Display and adjust room comfort setpoint
      iii. Display and adjust fan operation status
      iv. Setpoint override request via setpoint adjust dial or buttons
      v. Timed override request via occupancy override with status indication for activation of after-hours setpoint operation
      vi. Occupancy sensor status
      vii. Toggle between Degrees F and Degrees C
      viii. Toggle between temperature and humidity where specified
4. Thermowells
   a. Thermowell manufacturer shall have models available in stainless steel, brass body, and copper bulb.
   b. When thermowells are required, the sensor and well shall be supplied as a complete assembly, including wellhead and sensor.
   c. Thermowells shall be pressure rated and constructed in accordance with the system working pressure.
   d. Thermowells and sensors shall be mounted in a direct mount (no adapter) offering faster installation or 1/2” NFT saddle and allow easy access to the sensor for repair or replacement.
   e. Thermowells constructed of 316 stainless steel shall comply with Canadian Registration Number (CRN) pressure vessel rating.
5. Outside Air Sensors
   a. Outside air sensors shall be designed to withstand the environmental conditions to which they will be exposed. They shall be provided with a solar shield.
   b. Sensors exposed to wind velocity pressures shall be shielded by a perforated plate that surrounds the sensor element.
   c. Temperature transmitters shall be of NEMA 3R (IP54) or NEMA 4 (IP65) construction and rated for ambient temperatures.

d. The outdoor sensor shall be capable of being mounted on a roof, pole or side of a building utilizing its preassembled mounting bracket.

e. Outside air relative humidity sensors 0-100% full range of accurate measurement. Operating temperature -4 to 140°F (-20 to 60°C).

f. Outside air temperature sensors operating temperature range -40 to 140°F, +/- .55°F (+/- .3°C).

6. Duct Mount Sensors

a. Duct mount sensors shall mount in an electrical box through a hole in the duct, positioned to provide ease of accessibility for repair or replacement.

b. Duct sensors shall be insertion type and constructed as a complete assembly, including lock nut and mounting plate.

c. For outdoor air duct applications, a weatherproof mounting box with weatherproof cover and gasket shall be provided.

7. Averaging Sensors

a. For ductwork greater in any dimension that 48 inches and/or where air temperature stratification exists, an averaging sensor with multiple sensing points shall be used.

b. For plenum applications, such as mixed air temperature measurements, a continuous averaging sensor or a string of sensors mounted across the plenum shall be used to account for stratification and/or air turbulence. The averaging string shall have a minimum of 4 sensing points per 12-foot long segment.

c. Capillary supports at the sides of the duct shall be provided to support the sensing string.

~~Acceptable Manufacturers: Johnson Controls, Minco.~~

~~8. **Note**: Include other manufacturers, as appropriate.~~

C. Humidity Sensors

1. The sensor shall be a solid-state type, relative humidity sensor of the Thin Film Capacitance or Bulk Polymer Design. The sensor element shall resist service contamination.

2. The humidity transmitter shall be equipped with non-interactive span and zero adjustments, a 2-wire isolated loop powered, 4-20 mA, 0-100% linear proportional output.

3. The humidity transmitter shall meet the following overall accuracy, including lead loss and Analog to Digital conversion. 3% between 20% and 80% RH at 77°F unless specified elsewhere.

4. Outside air relative humidity sensors shall be installed with a rain proof, perforated cover. The transmitter shall be installed in a NEMA 3R (IP54) or NEMA 4 (IP65) enclosure with sealtite fittings.

5. A single point humidity calibrator shall be provided, if required, for field calibration. Transmitters shall be shipped factory pre-calibrated.

6. Duct type sensing probes shall be constructed of 304 stainless steel, and shall be equipped with a neoprene grommet, bushings, and a mounting bracket.

7. Acceptable Manufacturers: Johnson Controls and Vaisala.

D. CO_2 Sensors

1. Where shown on the drawings, CO_2 sensors shall have the following features:

a. Jumper selectable: 0-20mA, 4-20mA & 0-10 VDC output

b. Liquid Crystal Display (LCD)

2. The CO_2 sensors shall have the ability to monitor and output the following variables as required by the systems sequence of operations:

a. Zone CO_2

3. The CO_2 shall transmit the information back to the controller via jumper selectable 0-20mA, 4-20mA & 0-10 VDC output signals:

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a. The CO_2 sensors shall provide a maximum output current of 25mA; Maximum output voltage of 12.5V.

b. The CO_2 sensors shall be FCC compliant to CFR47 Part 15 subpart B Class A.

4. The CO_2 sensors shall be available with:

a. CO_2 response time (0-63%) of 1 minute

b. Less than 0.083% of full scale/°F temperature dependence of CO_2 output

c. Long term CO_2 stability ±5% of full scale for 5 years

d. CO_2 measurement accuracy of ±(40ppm + 2.0% of reading)

e. CO_2 non-linearity of less than 1.0% of full scale

5. The CO_2 sensors may include the following items:

a. Relay output module

b. LCD module

c. Analog temperature module with linear 0-10 VDC output for 32-122F

E. Differential Pressure Transmitters

1. General Air and Water Pressure Transmitter Requirements:

a. Pressure transmitters shall be constructed to withstand 100% pressure over-range without damage, and to hold calibrated accuracy when subject to a momentary 40% over-range input.

b. Pressure transmitters shall transmit a 0 to 5 VDC, 0 to 10 VDC, or 4 to 20 mA output signal.

c. Differential pressure transmitters used for flow measurement shall be sized to the flow sensing device, and shall be supplied with Tee fittings and shut-off valves in the high and low sensing pick-up lines to allow the balancing Contractor and Owner permanent, easy-to-use connection.

d. A minimum of a NEMA 1 housing shall be provided for the transmitter. Transmitters shall be located in accessible local control panels wherever possible.

2. Low Differential Water Pressure Applications (0" - 20" WC):

a. The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of flow meter differential pressure or water pressure sensing points.

b. The differential pressure transmitter shall have non-interactive zero and span adjustments that are adjustable from the outside cover and meet the following performance specifications:

i. .01-20" WC input differential pressure range

ii. 4-20 mA output

iii. Maintain accuracy up to 20 to 1 ratio turndown

iv. Reference Accuracy: +0.2% of full span

c. Acceptable Manufacturers: Setra and Mamac.

3. Medium to High Differential Water Pressure Applications (Over 21" WC):

a. The differential pressure transmitter shall meet the low-pressure transmitter specifications with the following exceptions:

i. Differential pressure range 10" WC to 300 PSI

ii. Reference Accuracy: +1% of full span (includes non-linearity, hysteresis, and repeatability)

b. Standalone pressure transmitters shall be mounted in a bypass valve assembly panel. The panel shall be constructed to NEMA 1 standards. The transmitter shall be installed in the panel with high and low connections piped and valved. Air bleed units, bypass valves, and compression fittings shall be provided.

c. Acceptable Manufacturers: Setra and Mamac.

4. Building Differential Air Pressure Applications (-1" to +1" WC):

a. The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points.

b. The differential pressure transmitter shall have non-interactive zero and span adjustments that are adjustable from the outside cover and meet the following performance specifications:

i. -1.00 to +1.00 WC input differential pressure ranges. (Select range appropriate for system application)

ii. 4-20 mA output

iii. Maintain accuracy up to 20 to 1 ratio turndown

iv. Reference Accuracy: +0.2% of full span

v. Acceptable Manufacturers: Johnson Controls or approved equal

5. Low Differential Air Pressure Applications (0" to 2.5" WC):

a. The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points.

b. The differential pressure transmitter shall have non-interactive zero and span adjustments that are adjustable from the outside cover and meet the following performance specifications.

i. (0.00 - 1.00" to 5.00") WC input differential pressure ranges (select range appropriate for system application)

ii. 4-20 mA, 0-5 VDC, 0-10 VDC output

iii. Maintain accuracy up to 20/1 ratio turndown

iv. Reference Accuracy: +0.25%, or 0.5% of full span

c. Acceptable Manufacturers: Johnson Controls and Ruskin

6. Medium Differential Air Pressure Applications (5" to 21" WC):

a. The pressure transmitter shall be similar to the Low Air Pressure Transmitter, except that the performance specifications are not as severe. Differential pressure transmitters shall be provided that meet the following performance requirements.

i. Zero & span: (c/o F.S./Deg. F): .04% including linearity, hysteresis and repeatability

ii. Accuracy: 1% F.S. (best straight line) Static Pressure Effect: 0.5% F.S. (to 100 psig.)

iii. Thermal Effects: <+.033 F.S./Deg. F. over 40°F to 100°F (calibrated at 70°F.)

b. Standalone pressure transmitters shall be mounted in a bypass valve assembly panel. The panel shall be constructed to NEMA 1 standards. The transmitter shall be installed in the panel with high and low connections piped and valved. Air bleed units, bypass valves, and compression fittings shall be provided.

c. Acceptable manufacturers: Johnson Controls and Ruskin

F. Flow Monitoring

1. Air Flow Monitoring

a. Fan Inlet Air Flow Measuring Stations

i. At the inlet of each fan and near the exit of the inlet sound trap, airflow sensors shall be provided that shall continuously monitor the fan air volumes or velocity pressure.

ii. Each sensor shall be surface mount type. Unit shall be capable of monitoring and reporting the airflow and temperature at each fan inlet location through two or four sensing circuits. If a static pressure manifold is used, it shall incorporate dual offset static tips on the opposing sides of the averaging manifold so as to be insensitive to flow-angle variations of as much as + 20° in the approaching air stream.

iii. Devices creating fan performance degradation, resulting in additional energy consumption, caused from pressure drop associated with probes or mounting apparatus in the center of the fan inlet are not allowed. The device shall not induce a significant pressure drop, nor shall the sound level within the duct be amplified by its singular or multiple presence in the air stream. Sensor circuit casings shall be constructed of U.L. 94 flame rated high impact ABS and include

a stainless steel thermistor cap that maintains the precise calibrated flow over the heated and ambient measurement points.

iv. Acceptable manufacturers: Johnson Controls, Air Monitor Corp., Tek-Air Systems, Inc., or Dietrich Standard

b. Single Probe Air Flow Measuring Sensor

i. The single probe airflow-measuring sensor shall be duct mounted with an adjustable sensor insertion length of up to eight inches. The transmitter shall produce a 4-20 mA or 0-10 VDC signal linear to air velocity. The sensor shall be a thermal dispersion and utilize one temperature sensor and a heated thermistor. The sensor pair shall measure the air temperature and airflow velocity.

c. Duct Air Flow Measuring Stations

i. Furnish and install, at locations shown on plans or as in accordance with schedules, an equalized air measuring probe system piped to a high performance pressure transducer or an electronic type airflow temperature measuring station.

ii. Each device shall be designed and built in order to comply with, and provide results in accordance with, accepted practice as defined for system testing in the ASHRAE Handbook of fundamentals, as well as in the Industrial Ventilation Handbook.

iii. Assembly shall be AMCA tested and capable of measuring a range from 70 to 5,000 FPM (22 to 1524 MPM).

iv. Equalized air measuring assembly shall measure to ±3% average and consist of 6063T5 extruded aluminum step sensing blade(s) with anodized finish, plenum-rated polyethylene pressure tubing, brass barbed fittings, mounting hardware and a glass-on-silicone capacitance sensor pressure transducer capable of measuring up to five field-selectable pressure ranges up to 2.5 in. WC.

v. The transducer shall be accurate to ±0.5%, or 0.25% of full scale and be contained in a National Electrical Manufacturer's Association (NEMA) 4 (IP-65) enclosure. Transducer shall be factory mounted and piped to high and low pressure ports through fittings made of brass.

vi. All sensor tubing shall terminate in solid brass barbed fittings.

vii. Total and static pressure manifolds shall terminate with external ports for connection to control tubing. An identification label shall be present on each unit casing, listing model number, size, area, and airflow capacity.

viii. Air straightener shall be provided for sizes over 17 square feet (1.6 sq meter).

ix. Airflow measuring station assemblies shall be fabricated of galvanized steel or aluminum casing of appropriate thickness for slip fits or with 90 Deg. connecting flanges in configuration and size equal to that of the duct into which it is mounted. Each station shall be complete with an air directionalizer and parallel cell profile suppressor (3/4" maximum cell) across the entering air stream and mechanically fastened to the casing in such a way to withstand velocities up to 5000 feet per minute.

x. Electronic air measuring station shall be capable of monitoring and reporting the airflow and temperature at each measuring location through one or more measuring probes containing multiple sensor points and a control transmitter that outputs a 4-20 mA linear signal.

xi. Probe(s) shall be constructed of an airfoil shaped aluminum extrusion containing the sensor circuit(s).

xii. Each sensor circuit shall consist of coated thermistors, for temperature and velocity, mounted to a Printed Circuit Board (PCB). Multiplexer board shall be encased to prevent moisture damage.

xiii. Control transmitter shall be capable of processing independent sensing points and shall operate on a fused 24 VAC supply.

xiv. Control transmitter shall feature a 16 x 2 character alphanumeric LCD screen, digital offset/gain adjustment, continuous performing sensor/transmitter diagnostics, and a visual alarm to detect malfunctions.

xv. Installation Considerations

- The maximum allowable pressure loss through the Flow and Static Pressure elements shall not exceed .04" WC at 1000 feet per minute, or .11" WC at 2000 feet per minute. Each unit shall measure the airflow rate within an accuracy of plus 3-5% as determined by AMCA.
- Where the stations are installed in insulated ducts, the airflow passage of the station shall be the same size as the inside airflow dimension of the duct. Station flanges shall be 1.5 inches to facilitate matching connecting ductwork.
- Where control dampers are provided as part of the airflow measuring station, parallel blade precision controlled volume dampers integral to the station and complete with actuator, and linkage shall be provided.
- Stations shall be installed in strict accordance with the manufacturer's published requirements, and in accordance with ASME Guidelines affecting non-standard approach conditions.

xvi. All air measuring devices shall be tested according to AMCA Standard 610.

xvii. Acceptable manufacturers: Johnson Controls, Air Monitor Corp., Tek-Air, Ruskin, and Dietrich Standard.

d. Static Pressure Traverse Probe

i. Duct static traverse probes shall be provided where required to monitor duct static pressure. The probe shall contain multiple static pressure sensors located along exterior surface of the cylindrical probe.

ii. Acceptable manufacturers: Cleveland Controls

e. Shielded Static Air Probe

i. Where indicated on plans or in schedules a shielded static pressure probe shall be provided at each end of the building. The probe shall have multiple sensing ports, an impulse suppression chamber, and airflow shielding.

f. Water Flow Monitoring

i. Water flow meters shall be electromagnetic type with integral microprocessor-Based electronics. The meter shall have an accuracy of 0.25%.

ii. Acceptable manufacturers: Onicon

G. Power Monitoring Devices

1. Current Measurement (amps)

a. Current measurement shall be by a combination current transformer and a current transducer. The current transformer shall be sized to reduce the full amperage of the monitored circuit to a maximum 5 Amp signal, which will be converted to a 4-20 mA DDC compatible signal for use by the Facility Management System.

b. Current Transformer – A split core current transformer shall be provided to monitor motor amps.

i. Operating frequency – 50 - 400 Hz

ii. Insulation – 0.6 Kv class 10Kv BIL

iii. UL recognized

iv. Five amp secondary

v. Select current range as appropriate for application

vi. Acceptable manufacturers: Setra

c. Current Transducer – A current to voltage or current to mA transducer shall be provided. The current transducer shall include:

i. 6X input over amp rating for AC inrushes of up to 120 amps

ii. Manufactured to UL 1244

iii. Accuracy: +.5%, Ripple +1%

iv. Minimum load resistance 30kOhm

v. Input 0-20 amps

vi. Output 4-20 mA

vii. Transducer shall be powered by a 24 VDC regulated power supply (24 VDC +5%)

viii. Acceptable manufacturers: Setra

H. Refrigerant Leak Detectors ~~[delete this section is refrigerant monitors to be provided by others]~~

1. The refrigerant leak detector shall be a standalone device and shall provide SPDT switch contacts to directly energize the refrigeration room exhaust ventilation fans. The detector shall include a sensor or sensors connected to a control panel. Two relay contacts at the control panel shall provide trouble and alarm indication to the Facility Management System. The alarm relay contact shall also directly energize the exhaust fans.
2. The refrigerant leak detector shall sense the type of refrigerant used in the specified chillers. Multiple sensors shall be required to detect different refrigerants and/or provide proper sensing coverage for the area of the refrigeration room.
3. Acceptable manufacturers: Johnson Controls, MSA Instruments

I. Smoke Detectors

1. Ionization type air duct detectors shall be furnished as specified elsewhere in Division 26 for installation under Division 23. All wiring for air duct detectors shall be provided under Division 26, Fire Alarm System.

J. Status and Safety Switches

1. General Requirements
   a. Switches shall be provided to monitor equipment status, safety conditions, and generate alarms at the Building Management System (BMS) when a failure or abnormal condition occurs. Safety switches shall be provided with two sets of contacts and shall be interlock wired to shut down respective equipment.
2. Current Sensing Switches
   a. The current sensing switch shall be self-powered with solid-state circuitry and a dry contact output. It shall consist of a current transformer, a solid state current sensing circuit, adjustable trip point, solid state switch, SPDT relay, and an LED indicating the on or off status. A conductor of the load shall be passed through the window of the device. It shall accept over-current up to twice its trip point range.
   b. Current sensing switches shall be used for run status for fans, pumps, and other miscellaneous motor loads.
   c. Current sensing switches shall be calibrated to show a positive run status only when the motor is operating under load. A motor running with a broken belt or coupling shall indicate a negative run status.
   d. Acceptable manufacturers: Johnson Controls or approved equal
3. Air Filter Status Switches
   a. Differential pressure switches used to monitor air filter status shall be of the automatic reset type with SPDT contacts rated for 2 amps at 120VAC.
   b. A complete installation kit shall be provided, including: static pressure tops, tubing, fittings, and air filters.
   c. Provide appropriate scale range and differential adjustment for intended service.
   d. Acceptable manufacturers: Johnson Controls, Cleveland Controls
4. Air Flow Switches
   a. Differential pressure flow switches shall be bellows actuated mercury switches or snap acting micro-switches with appropriate scale range and differential adjustment for intended service.
   b. Acceptable manufacturers: Johnson Controls, Cleveland Controls
5. Air Pressure Safety Switches

a. Air pressure safety switches shall be of the manual reset type with SPDT contacts rated for 2 amps at 120VAC.

b. Pressure range shall be adjustable with appropriate scale range and differential adjustment for intended service.

c. Acceptable manufacturers: Johnson Controls, Cleveland Controls

6. Water Flow Switches

a. Water flow switches shall be equal to the Johnson Controls P74.

7. Low Temperature Limit Switches

a. The low temperature limit switch shall be of the manual reset type with Double Pole/Single Throw snap acting contacts rated for 16 amps at 120VAC.

b. The sensing element shall be a minimum of 15 feet in length and shall react to the coldest 18-inch section. Element shall be mounted horizontally across duct in accordance with manufacturers recommended installation procedures.

c. For large duct areas where the sensing element does not provide full coverage of the air stream, additional switches shall be provided as required to provide full protection of the air stream.

d. The low temperature limit switch shall be equal to Johnson Controls A70.

K. Control Relays

1. Control Pilot Relays

a. Control pilot relays shall be of a modular plug-in design with retaining springs or clips.

b. Mounting Bases shall be snap-mount.

c. DPDT, 3PDT, or 4PDT relays shall be provided, as appropriate for application.

d. Contacts shall be rated for 10 amps at 120VAC.

e. Relays shall have an integral indicator light and check button.

f. Acceptable manufacturers: Johnson Controls, Lectro

2. Lighting Control Relays

a. Lighting control relays shall be latching with integral status contacts.

b. Contacts shall be rated for 20 amps at 277 VAC.

c. The coil shall be a split low-voltage coil that moves the line voltage contact armature to the On or Off latched position.

d. Lighting control relays shall be controlled by:

i. Pulsed Tristate Output – Preferred method

ii. Pulsed Paired Binary Outputs

iii. A Binary Input to the Facility Management System shall monitor integral status contacts on the lighting control relay. Relay status contacts shall be of the “dry-contact” type.

e. The relay shall be designed so that power outages do not result in a change-of-state, and so that multiple same state commands will simply maintain the commanded state. Example: Multiple Off command pulses shall simply keep the contacts in the Off position.

L. Electronic Signal Isolation Transducers

1. A signal isolation transducer shall be provided whenever an analog output signal from the BMS is to be connected to an external control system as an input (such as a chiller control panel), or is to receive as an input signal from a remote system.

2. The signal isolation transducer shall provide ground plane isolation between systems.

3. Signals shall provide optical isolation between systems.

4. Acceptable manufacturers: Advanced Control Technologies

~~L. Electronic/Pneumatic Transducers~~

1. Electronic to Pneumatic transducers shall provide:

Output: 3-15 psig

a. Input: 4-20 mA or 0-10 VDC

a. Manual output adjustment

a. Pressure gauge

a. External replaceable supply air filter

1. Acceptable manufacturers: Johnson Controls, Mamac

A. Thermostats – Electric

1. Electric room thermostats of the heavy-duty type shall be provided for unit heaters, cabinet unit heaters, and ventilation fans, where required. All these items shall be provided with concealed adjustment. Finish of covers for all room-type instruments shall match and, unless otherwise indicated or specified, covers shall be manufacturer's standard finish.

1. Acceptable Manufacturers: Penn, Emerson, Honeywell

23 09 13.33 Control Valves

A. Ball Valves, 1/2 through 2 in.

1. Ball Valves shall have forged brass bodies.
2. Valves shall have available either Chrome Plated Brass Balls or 300 Series Stainless Steel Balls in all sizes.
3. Valves shall have available either Nickel Plated Brass Stems or 300 Series Stainless Steel Stems with a blow-out proof stem design in all sizes.
4. Valves shall have Graphite reinforced Polytetrafluoroethylene (PTFE) seats with Ethylene Propylene Diene Monomer (EPDM) O-ring backing.
5. Stem seals shall be double EPDM O-rings.
6. Flow Characterization Disk shall be manufactured from Amodel AS-1145HS Polyphthalamide Resin and rated for 50 psi maximum differential pressure and shall be inserted against the casting of the valve.
7. All ball valves with internal pipe thread end connections shall be rated to 580 psi maximum static pressure at 203°F (95°C) fluid temperature.
8. All ball valves with sweat end connections or press end connection shall be rated to 300 psig maximum static pressure at 203°F (95°C) fluid temperature.
9. All valves shall be rated for service with hot water, chilled water and 50% glycol solutions.
10. Ball Valves with stainless steel balls and stems shall be rated for use with 15 psig saturated steam.
11. Flow Characteristics shall be equal percentage on the control port. Bypass port on three-way valves shall have linear flow characteristics.
12. Valves shall have a maximum leakage specification of 0.01% of maximum flow for the control port, ANSI/FCI 70-2, Class 4 and 1% of maximum flow, bypass port.
13. Valves shall be maintenance free.
14. Valves shall be provided with a 5 year equipment warranty.
15. Valves shall be rated for 200 psi differential closeoff pressure.
16. Valve actuators shall be UL-recognized or CSA-certified.
17. Valves shall be Johnson Controls VG1000 Series ball valves or approved equal.

B. Ball Valves, ½ in. to 1 in. with integrated controller

17. Ball valves shall have forged brass bodies.

17. Valves shall be available in either chrome plated brass balls or 300 series stainless steel balls in all sizes.

17. Valves shall be available in all sizes with either a nickel plated brass stems or 300 series steel stems with a blow-out proof stem design.
17. Valves shall have graphite reinforced PTFE seats with EPDM O-ring backing.
17. Stem seals shall be double EPDM O-rings.
17. Flow characterization disks shall be manufactured from Amodel AS-1145HS Polypthalamide Resin and rated for 50 psid maximum differential pressure and shall be inserted against the casting of the valve. The valves shall be installed in any flow direction because of the non-directional disk design.
17. Flow characteristics shall be of equal percentage on the control port. Bypass port on three-way valves shall have linear flow characteristics.
17. Valves with internal pipe thread end connections shall be rated to 580 psi maximum static pressure at 203°F (95°C) fluid temperature.
17. Valves with sweat end connections or press end connection shall be rated to 300 psig (kPa) maximum static pressure at 203°F (95°C) fluid temperature.
17. Valves shall be rated for service with hot water, chilled water and 50% glycol solutions.
17. Ball valves with stainless steel balls and stems shall be rated for use with 15 psig (103 kPa) saturated steam.
17. Ball valves shall have a maximum leakage specification of 0.01% of maximum flow for the control port, ANSI/FCI 70-2, Class 4 and 1% maximum flow, bypass port.
17. Ball valves shall be maintenance free.
17. Ball valves shall be provided with a 5 year warranty from the date of sale. Valves sold in the APAC region shall comply with an 18 month warranty policy.
17. Ball valves shall be rated for 200 psid (1,378 kPa) close off pressure.
17. Ball valves shall be UL-recognized or CSA-certified. APAC valves shall be excluded from this regulatory information.
17. Ball valves shall be Johnson Controls VG1000 Series Ball Valves or approved equal.

T. Ball valves ½ in. through 1 in with integrated controllers and actuators

The specifications apply to Ball valves ½ in. through 1 in. with integrated controller or actuators.

17. The actuator or controller shall provide both standalone and networked direct digital control of terminal units.
17. The actuator or controller shall be BACnet Testing Labs (BTL) listed/certified and carry the BTL Label.
17. The actuator or controller shall tested and certified as a BACnet Application Specific Controller (B-ASC).
17. A BACnet Protocol Implementation Conformance Statement shall be provided for the actuator or controller.
17. The actuator or controller shall communicates over the Field Controller Bus (FC Bus) using BACnet Standard protocol SSPC-135, Clause 9.
17. The actuator or controllers shall have internal electrical isolation for AC power, DC inputs, and MS/TP communications. An externally mounted isolation transformer shall not be acceptable.
17. The actuator/controller shall be a configurable digital controller. All components shall be connected and mounted as a single assembly that can be removed as one piece. With ball valve linkage for use on the Johnson Controls VG-1000 1/2 inch to 1 inch valves.
17. The actuator or controller shall be assembled in a plenum-rated plastic housing with flammability rated to UL95-5VB or the controller is designed and suitable for use in other environmental air spaced (plenums) in accordance with Section 300.252© of the National Electrical Code.
17. Each controller shall continuously and adaptively tune the control algorithms to improve control and controller reliability through reduced actuator duty cycle. This shall reduce commissioning costs and eliminated the maintenance costs of manually re-tuning loops to compensate for load changes.

31. The controller shall provide the ability to download and upload configuration files, both locally and through the communications network. Controllers shall be able to be loaded individually or as a group using a zone schedule generated spreadsheet of controller parameters.

32. Control set point changes initiated over the network shall be written to the actuator or the controller's non-volatile memory to prevent the loss of set point changes and to prove consistent operation in the event of a communication failure.

33. The controller firmware shall be flash-upgradeable remotely through the communications bus to minimize the cost of feature enhancements.

34. Inputs:

ii. Analog inputs with user defined ranges shall monitor the following analog signals, with only the equipment in the terminal controller cabinet:

xxxvi. 0 VDC to10 VDC Sensors

xxxvii. 1000 ohm RTDs

xxxviii. NTC Thermistors

mm. Binary inputs shall monitor dry contact closures. Filtering shall eliminate false signals resulting from input 'bouncing'.

nn. The inputs shall be isolated from power, communications, and output circuits for noise immunity.

oo. Provide side loop application for humidity control.

42. Outputs:

qq. Analog output shall provide a 0 VDC to 10 VDC control output.

rr. Binary outputs shall provide a SPST Triac output rated for 500 mA at 24 VAC.

ss. For noise immunity, the outputs shall be internally isolated from power, communications, and other output circuits.

46. The actuator or controller shall be configured with a software tool that provides a question and answer format for developing and downloading applications.

47. Sensor support:

vv. The actuator or controller shall communicate over the Sensor-Actuator Bus (SA Bus) with a Network Sensor.

ww. The actuator or controller shall support an LCD display room sensor.

xx. The actuator or controllers shall support standard room sensors as defined by analog input requirements.

yy. The actuator or controllers shall support humidity sensors defined by the AI side loop.

ZZ.B. Ball Valves, 2 in. to ½ .in through 4 in. Flanged

1. Ball valves shall have forged brass bodies with ASME Class 150 ductile iron flanges.
2. Valves shall be manufactured from 300 series stainless steel balls and the flanges shall rotate independently until tightened down which is an advantage during installation.
3. Valves shall have 300 series steel stems with a blow-out proof stem design.
4. Stem seals shall have double EPDM O-rings.
5. Valves have graphite reinforced PTFE seats with EPDM O-ring backing.
6. Flow characterization disk shall be manufactured from Amodel AS-1145HS Polypthalamide Resin and rated for 50 psid maximum differential pressure.
7. Flow characteristics shall be of equal percentage on the control port. Bypass port on three-way valves shall have linear flow characteristics.
8. Valves shall be rated for service with hot water, chilled water and 50% glycol solutions and are rated for use with 25 psig (kPa) saturated steam.

9. Two-way valves shall be rated for 100 psid close off pressure and three-way valves shall be rated for maximum of 50 psid close off pressure.
10. Valves shall have a maximum leakage specification of 0.01% of maximum flow for the control port, ANSI/FCI 70-2, Class 4 and 1% of maximum flow, bypass port.
11. Valves shall be maintenance free.
12. Valves shall be provided with a 5 year warranty. Valves sold in the APAC region shall comply with an 18 month warranty policy.
13. Valves shall be CE marked as Johnson Controls declares these valves are in compliance with essential requirements and other relevant provisions of the Pressure Equipment Directive (PED). APAC actuators shall be excluded from this regulatory information.
14. Valves shall be Johnson Controls VG1000 Series ball valves or approved equal.

~~AAA.~~C. Butterfly Valves, 2 through 20 in. resilient seat ASME Class 125/150 Flanged

1. Butterfly valves shall have cast iron bodies meetings ASTM A126 Class B requirements, meet ASME class 125/150 flange requirements and shall be fully lugged.
2. Valves seats shall be EPDM.
3. Valves disks shall be ductile iron with Nylon 11 coating.
4. Valves stems shall be stainless steel.
5. Flow characteristics shall be of equal percentage up to 70 degrees of disk rotation.
6. Valves shall be rated for service with hot water, chilled water and 50% glycol solutions.
7. Valves shall be maintenance free.
8. Valves shall be provided with a 3 year warranty. Valves sold in the APAC region shall comply with an 18 month warranty policy.
9. Valves shall be UL-recognized and CSA-certified. Valves sold in the APAC region shall be excluded from this regulatory information.
10. Valves shall be Johnson Controls VF series butterfly valves or approved equal.

~~BBB.~~D. Butterfly Valves, High Performance 2-1/2 through 16 in.

1. Butterfly valve shall have bodies manufactured from carbon steel, ASTM A216 GR WCB/A516 GR 70 and shall be fully lugged per ASME Class 150 or ASME Class 300.
2. Valve seat assemblies shall be RPTFE (reinforced polytetrafluorethylene) and the seat retainer shall be carbon steel, ASTM A516 GR 70.
3. Valve disks shall be stainless steel, ASTM A 351 GR CF8M.
4. Valve stems shall be 17-4 PH stainless steel, ASTM A564-Type 630.
5. Stem seals shall be one carbon fiber ring and three TFE rings.
6. Flow characteristics shall be equal percentage up to 70° of disk rotation.
7. Valves shall be rated for service with hot water, chilled water, 50% glycol solutions and 50 psig (kPa) saturated steam in modulating service or 150 psig (kPa) saturated steam in two position service.
8. Valves shall meet the performance requirements of the ASMA Class 150 and Class 300.
9. Valves shall be maintenance free.
10. Valves shall be provided with a 3 year warranty. Valves sold in the APAC region shall comply with an 18 month warranty policy.
11. Valves shall be UL–recognized or CSA-certified. APAC valves shall be excluded from this regulatory information.
12. Valves shall be Johnson Controls VF Series Butterfly Valves or approved equal.

23 09 13.43 Control Dampers

A. The BMS Contractor shall furnish all automatic dampers that are NOT provided with the Air Handling Units as noted on schedule and/or drawings. All automatic dampers shall be sized for the application by the BMS Contractor or as specifically indicated on the drawings.

B. All dampers used for throttling airflow shall be of the opposed blade type arranged for normally open or normally closed operation, as required. The damper is to be sized so that, when wide open, the pressure drop is a sufficient amount of its close-off pressure drop to shift the characteristic curve to near linear.

C. All dampers used for two-position, open/close control shall be parallel blade type arranged for normally open or closed operation, as required.

D. Damper frames and blades shall be constructed of either galvanized steel or aluminum. Maximum blade length in any section shall be 60". Damper blades shall be 16-gauge minimum and shall not exceed eight (8) inches in width. Damper frames shall be 16-gauge minimum hat channel type with corner bracing. All damper bearings shall be made of reinforced nylon, stainless steel or oil-impregnated bronze. Dampers shall be tight closing, low leakage type, with synthetic elastomer seals on the blade edges and flexible stainless steel side seals. Dampers of 48"x48" size shall not leak in excess of 8.0 cfm per square foot when closed against 4" WC static pressure when tested in accordance with AMCA Std. 500.

~~Note: Download Control Damper Guide Specs as required and add content.~~

~~F.~~E. Airfoil blade dampers of double skin construction with linkage out of the air stream shall be used whenever the damper face velocity exceeds 1500 FPM or system pressure exceeds 2.5" WC, but no more than 4000 FPM or 6" WC.

1. Acceptable manufacturers are Johnson Controls VD-1250, VD1630, or VD-1330, Ruskin CD50 or CD60, and Vent Products 5650.

~~G.~~F. One piece rolled blade dampers with exposed or concealed linkage may be used with face velocities of 1500 FPM or below.

1. Acceptable manufacturers: Johnson Controls VD-1620, VD-1320, Ruskin CD36, and Vent Products 5800.

~~H.~~G. Multiple section dampers may be jack-shafted to allow mounting of piston pneumatic actuators and direct connect electronic actuators. Each end of the jackshaft shall receive at least one actuator to reduce jackshaft twist.

23 09 23 Direct-Digital Control System for HVAC/Building Management System

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Part 1 – General

1.A ~~General Requirements~~

0. ~~The BMS Contractor shall thoroughly review all aspects of the BMS and shall furnish, install, program, and test all products and functionality as listed within this specification without exception. If any deviations or variances are encountered during the review, Contractor shall submit them 30 days before the bid to the engineer in the form of a full specification compliance statement indicating in the left margin the following:~~

   1. ~~"C" Comply with no exceptions~~
   2. ~~"D": Deviation. Equipment, product or material does not comply. For each and every deviation, provide a numbered footnote with reasons for each deviation and suggest possible alternatives for the Owner's consideration.~~
   3. ~~"N/A": The specification paragraph does not apply to the proposed equipment, material or product.~~

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1.F1.A Related Documents

1. All work of this Division shall be coordinated and provided by the single BMS Contractor.
2. The work of this Division shall be scheduled, coordinated, and interfaced with the associated work of other trades. Reference the applicable sections for details.
3. The work of this Division shall be as required by the Specifications, Point Schedules and Drawings.
4. If the BMS Contractor believes there are conflicts or missing information in the project documents, the Contractor shall promptly request clarification and instruction from the design team.

1.G1.B BMS System Description

1. The BMS shall be a complete system designed for use with the enterprise IT systems and an extension of SIUE's existing Metasys Server. This functionality shall extend into the equipment rooms. Devices residing on the automation network located in equipment rooms and similar shall be fully IT compatible devices that mount and communicate directly on the Owner's IT infrastructure in the facility. Contractor shall be responsible for coordination with the owner's IT staff to ensure that the BMS will perform in the owner's environment without disruption to any of the other activities taking place on that LAN.

2. The BMS automation network shall have a means of remotely communicating via a wireless internet connection with an application data server on a temporary basis until Owner's IT infrastructure is installed and commissioned. This allows the BMS work and testing to be executed prior to permanent internet service is established in the building. Further details of this functionality are specified in Part 2.

3.2. Any and all components of the BMS that are connected via field buses or Owner's IT network, including the network controllers, field controllers, application specific controllers, server and user interface software, system and controller programming tools and software applications shall be designed, engineered, and tested to work together as a complete building management system, and shall all be developed, supported and manufactured by the same BMS manufacturer. Systems that use or require network controllers, field controllers, application specific controllers, server and user interface software, programming tools and software from more than one BMS manufacturer are not permitted.

4. All points of user interface shall be on standard computing devices that do not require the purchase of any special software from the BMS manufacturer for use as a building operations terminal. The primary point of interface on these devices will be a standard Web Browser.

Note: Item 4 is only applicable on systems with extensive data storage or simultaneous user access requirements

6.3. Where necessary and as dictated elsewhere in these Specifications, a The existing SIUE Metasys Server shall be used for the purpose of providing a location for extensive archiving of system configuration data, and historical data such as trend data and operator transactions. All data stored will be through the use of a standard data base platform: Microsoft SQL Server Express or Microsoft SQL Server as dictated elsewhere in this specification.

7.4. The work of the single BMS Contractor shall be as defined individually and collectively in all Sections of this Division specification together with the associated Point Sheets and Drawings and the associated interfacing work as referenced in the related documents.

8.5. The BMS work shall consist of the provision of all labor, materials, tools, equipment, software, software licenses, software configurations and database entries, interfaces, wiring, tubing, installation, labeling, engineering, calibration, documentation, samples, submittals, testing, commissioning, training services, permits and licenses, transportation, shipping, handling, administration, supervision, management, insurance, temporary protection, cleaning, cutting and patching, warranties, services, and items, even though these may not be specifically mentioned in these Division documents which are required for the complete, fully functional and commissioned BMS.

9.6. Provide a complete, neat and workmanlike installation. Use only manufacturer employees or subcontractors who are skilled, experienced, trained, and familiar with the specific equipment, software, standards and configurations to be provided for this Project.

10.7. Manage and coordinate the BMS work in a timely manner in consideration of the Project schedules. Coordinate with the associated work of other trades so as not to impede or delay the work of associated trades.

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~~11.~~8. The BMS as provided shall incorporate, at minimum, the following integrated features, functions and services:

a. Operator information, alarm management and control functions

b. Information management including monitoring, transmission, archiving, retrieval, and reporting functions

c. Diagnostic monitoring and reporting of BMS functions

d. Energy management

e. Standard applications for terminal HVAC systems

f. Enterprise-wide information and control access

g. Offsite monitoring and management access

h. ~~[~~Indoor Air Quality monitoring and control~~] DELETE THIS REQUIREMENT IF NO IAQ REQUIRED~~

i. Fault Detection and Fault Triage ~~DELETE THIS REQUIREMENT IF ENGINE-ONLY SITE~~

~~1.H~~1.C Quality Assurance

1. General

a. The BMS Contractor shall be the primary manufacturer-owned branch office that is regularly engaged in the engineering, programming, installation and service of total integrated BMS.

~~b. The BMS Contractor shall be a recognized national manufacturer, installer and service provider of BMS.~~

~~Note: Include/edit items c., d., e., f. as required for the specific project~~

~~d.~~b. The BMS installer shall be a BMS manufacturer-owned branch office~~, or an independent controls contractor~~ who is factory trained and authorized by the BMS manufacturer to sell, service and support the BMS specified herein.

~~e. Independent BMS distributor/contractor pre-approval process:~~

~~i. Independent BMS distributors and/or contractors desiring to bid this project who are authorized by the BMS manufacturer to represent the BMS manufacturer's products must provide two letters prior to bid day. A letter formally requesting approval to bid on this project accompanied by a specification compliance review, and a letter written and signed by a company officer of the BMS manufacturer distributed by the BMS distributor. This document must be dated within the 30 days prior to bid submittal and must state that they are currently a "direct authorized representative" in good standing for the BMS manufacturer for the building management system products described and listed in this specification, that they have "direct purchasing access" to all of the BMS manufacturer's controllers, servers, software and components and technical support, and that they will continue to be an Authorized representative with this access for the duration of the installation and warranty phases of project. Upon receipt of the letters, the engineer shall review and if approved, shall be listed in an addendum.~~

~~ii. If approved, the independent BMS contractor must provide a third letter written by a company officer of the specific BMS manufacturer with the following verbiage: "should this contractor fail to provide a complete and operational system (as judged by the owner/engineer), the Manufacturer will complete the project to the Engineer's satisfaction at no additional cost to the Owner". This letter shall be included with BMS submittals.~~

~~h.~~c. The BMS Contractor shall have a branch facility within a 100-mile radius of the job site supplying complete maintenance and support services on a 24 hour, 7-day-a-week basis. The BMS Contractor shall have, at this facility, a trained, directly employed and full time technical staff, spare parts inventory, and all necessary test and diagnostic equipment.

~~i.~~d. As evidence and assurance of the contractor's ability to support the Owner's system with service and parts, the contractor must have been in the BMS business for at least the last ten (10) years and have successfully completed total projects of at least 10 times the value of this contract in each of the preceding five years.

~~j.~~e. The BMS architecture shall consist of the products of a manufacturer regularly engaged in the production of BMS, and shall be the manufacturer's latest standard of design at the time of bid.

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2. Workplace Safety and Hazardous Materials
   a. Provide a safety program in compliance with the Contract Documents.
   b. The BMS Contractor shall have a corporately certified comprehensive Safety Certification Manual and a designated Safety Supervisor for the Project.
   c. The Contractor and its employees and subtrades shall comply with federal, state and local safety regulations.
   d. The Contractor shall ensure that all subcontractors and employees have written safety programs in place that covers their scope of work, and that their employees receive the training required by the OSHA rules that have jurisdiction for at least each topic listed in the Safety Certification Manual.
3. Quality Management Program
   a. Designate a competent and experienced employee to provide BMS Project Management. The designated Project Owner shall be empowered to make technical, scheduling and related decisions on behalf of the BMS Contractor. At minimum, the Project Owner shall:
      - Manage the scheduling of the work to ensure that adequate materials, labor and other resources are available as needed.
      - Manage the financial aspects of the BMS Contract.
      - Coordinate as necessary with other trades.
      - Be responsible for the work and actions of the BMS workforce on site.

~~1.1~~1.D References

1. All work shall conform to the following Codes and Standards, as applicable:
   a. National Fire Protection Association (NFPA) Standards
   b. National Electric Code (NEC) and applicable local Electric Code
   c. UL listing and labels
   d. UL 864 10th Edition UUKL Smoke Control (for USA and Canada)
   e. UL 268 Smoke Detectors
   f. UL 916 Energy Management
   g. NFPA 70 – National Electrical Code
   h. NFPA 90A – Standard For The Installation Of Air Conditioning And Ventilating Systems
   i. NFPA 92A and 92B Smoke Purge/Control Equipment
   j. Factory Mutual (FM)
   k. American National Standards Institute (ANSI)
   l. National Electric Manufacturer's Association (NEMA)
   m. American Society of Mechanical Engineers (ASME)

   ~~Note: add ASHRAE 62 IAQ as applicable below.~~

   ~~o.~~n. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)

   ~~p.~~o. Air Movement and Control Association (AMCA)

   ~~q.~~p. Institute of Electrical and Electronic Engineers (IEEE)

   ~~r.~~q. American Standard Code for Information Interchange (ASCII)

   ~~s.~~r. Electronics Industries Association (EIA)

   ~~t.~~s. Occupational Safety and Health Administration (OSHA)

   ~~u.~~t. American Society for Testing and Materials (ASTM)

   ~~v.~~u. Federal Communications Commission (FCC) including Part 15, RF Devices

   ~~w.~~v. Americans Disability Act (ADA)

x.w. ANSI/EIA 909.1-A-1999 (LonWorks®)

y.x. ANSI/ASHRAE Standard 195 (BACnet)

Note: add ASHRAE 62 IAQ as applicable

3.2. In the case of conflicts or discrepancies, the more stringent regulation shall apply.

4.3. All work shall meet the approval of the Authorities Having Jurisdiction at the project site.

1.J1.E Work By Others

1. The demarcation of work and responsibilities between the BMS Contractor and other related trades shall be as outlined in the BMS RESPONSIBILITY MATRIX.

Note: Include responsibility matrix as required for project coordination and common practice of the specifier.

BMS Responsibility Matrix

Work	Furnish	Install	Low Volt. Wiring/Tube	Line Power
BMS low voltage and communication wiring *1 (note 1)	BMS	BMS	BMS	N/A
VAV box controller (note 2)	BMS	23*2	BMS	26
BMS conduits and raceway	BMS	BMS	BMS	BMS
Automatic dampers (non-factory)	BMS	23	N/A	N/A
Automatic valves	BMS	23	BMS	N/A
VAV boxes	23	23	N/A	N/A
Pipe insertion devices and taps including thermowells, flow and pressure stations.	BMS	23	BMS	BMS
BMS Current Switches.	BMS	BMS	BMS	N/A
BMS Control Relays	BMS	BMS	BMS	N/A
Power distribution system monitoring interfaces	26	26	BMS	26
Concrete and/or inertia equipment pads and seismic bracing	23	23	N/A	N/A
BMS interface with Chiller controls	BMS	BMS	BMS	BMS
Chiller controls interface with BMS	23	23	BMS	26
Elect. baseboard heating control (note 3)	23	26*3	N/A*3	26
ADD OTHER THIRD PARTY EQUIPMENT HERE	N/A	N/A	N/A	N/A
All BMS Nodes, equipment, housings, enclosures and panels.	BMS	BMS	BMS	BMS
Smoke Detectors (note 4)	26	26	26/BMS *4	26
Fire/Smoke Dampers (note 5)	23	23	BMS*5	26
Fire Dampers	23	23	N/A	N/A
Chiller Flow Switches	23	23	BMS	N/A
Boiler wiring	23	23	23	23
Water treatment system	23	23	23	26
VSDs	BMS	26	BMS	26
Refrigerant monitors	BMS	BMS	BMS	26
Computer Room A/C Unit field-mounted controls	23	23	BMS	26

Work	Furnish	Install	Low Volt. Wiring/Tube	Line Power
Fire Alarm shutdown relay interlock wiring	26	26	26	26
Fire Alarm smoke control relay interlock wiring	26	26	BMS	26
Fireman's Smoke Control Override Panel	26	26	26	26
Fan Coil Unit controls	BMS	BMS	BMS	26
Cabinet/Unit Heater controls (note 6)	BMS/23*6	26/BMS*6	BMS	26
Packaged RTU space mounted controls	23	BMS	BMS	26
Packaged RTU factory-mounted controls	23	23	BMS	26
Packaged RTU field-mounted controls	BMS	BMS	BMS	26
Cooling Tower Vibration Switches	23	23	26	26
Cooling Tower Level Control Devices	23	23	26	26
Cooling Tower makeup water control devices	23	23	26	26
Starters, HOA switches	26	26	N/A	26
Control damper actuators	BMS	BMS	BMS	26

Footnotes:

*1. BMS low voltage and communications wiring: BMS Ethernet communications cable and IP infrastructure furnish and install by BMS Contractor or Division 26 Electrical Contractor as per options in Row #1 of the BMS Responsibility Matrix above.

*2. VAV box controller factory installation would normally be by Division 23 Mechanical who furnishes the VAV boxes; could be by BMS for field installation of special controllers, see Row #2 of the BMS Responsibility Matrix above.

*3. Electric Baseboard Heating Controls – for line voltage stand-alone controls: furnished by Division 23 Mechanical Contractor who furnishes the baseboard units; line voltage controls installed and connected by Division 26 Electrical Contractor. Alternately, controls may be furnished and installed by BMS Contractors for projects requiring Baseboard Heating controls to be integrated into the BMS. Refer to Section 230993 SEQUENCE OF OPERATIONS.

*4. Smoke Detector also wired to shut down AHU/HVAC by BMS Contractor; Division 26 for projects NYC. Duct smoke detectors and fire alarm control modules shall be provided by others. Provide wiring, conduit, and necessary interface with fire alarm system to perform specified sequence of operation

*5. Fire/Smoke Dampers: BMS Contractor to provide and ensure OPEN/CLOSE control of Fire/Smoke dampers as coordinated between BMS HVAC systems sequences, controls and overrides, and the Fire Alarm system control status priorities and overrides. Coordinate with Division 26 to provide duct detectors or fire alarm control modules for air handling unit and exhaust system shutdown and smoke control inputs to the DDC system. In most cases fire alarm control modules will be the most effective and flexible way of achieving this interface. Ensure that the logic matrix for the fire alarm devices to trigger a HVAC response is clearly specified.

*6. Cabinet/Unit Heater Controls – for line voltage stand-alone controls: furnished by Division 23 Mechanical Contractor who furnishes the Cabinet/Unit Heaters; line voltage stand-alone controls installed and connected by Division 26 Electrical Contractor. Even for stand-alone controls, it is common for the line voltage TStat and associated interlock wiring to be installed by the BAS. The power to the UH/CUH is performed by the Division 26 contractor. Alternately, controls may be furnished and installed by BMS Contractors for projects requiring Cabinet/Unit Heater controls to be integrated into BMS. Refer to Section 230993 SEQUENCE OF OPERATIONS.

~~1.K~~1.F Submittals

1. Shop Drawings, Product Data, Training, and Samples
   a. The BMS contractor shall submit a list of all shop drawings with submittals dates within 30 days of contract award.
   b. Submittals shall be in defined packages. Each package shall be complete, shall only reference itself, and previously submitted packages. The packages shall be as approved by the Architect and Engineer for Contract compliance.
   c. Allow 15 working days for the review of each package by the Architect and Engineer in the scheduling of the total BMS work.
   d. Equipment and systems requiring approval of local authorities must comply with such regulations and be approved. Filing shall be at the expense of the BMS Contractor where filing is necessary. Provide a copy of all related correspondence and permits to the Owner.
   e. Prepare an index of all submittals and shop drawings for the installation. Index shall include a shop drawing identification number, Contract Documents reference and item description.
   f. The BMS Contractor shall correct any errors or omissions noted in the first review.
   g. At a minimum, submit the following:
      - BMS network architecture diagrams including all nodes and interconnections
      - Systems schematics, sequences, and flow diagrams
      - Points schedule for each point in the BMS, including: Point Type, Object Name, Expanded ID, Display Units, Controller type, and Address
      - Samples of Graphic Display screen types and associated menus
      - Detailed Bill of Material list for each system or application, identifying quantities, part numbers, descriptions, and optional features
      - Control Damper Schedule including a separate line for each damper provided under this section and a column for each of the damper attributes, including Code Number, Fail Position, Damper Type, Damper Operator, Duct Size, Damper Size, Mounting, and Actuator Type
      - Room Schedule including a separate line for each VAV box and/or terminal unit indicating location and address
      - Control Valve Schedules including a separate line for each valve provided under this section and a column for each of the valve attributes: Code Number, Configuration, Fail Position, Pipe Size, Valve Size, Body Configuration, Close off Pressure, Capacity, Valve CV, Design Pressure, and Actuator Type
      - Details of all BMS interfaces and connections to the work of other trades
      - Product data sheets or marked catalog pages including part number, photo and description for all products including software
      - Owner training agenda

~~Note: Delete item 2 below if project is a new greenfield construction job. Leave in for an upgrade to an existing Metasys BMS~~

~~13. Existing Systems Inventory~~

~~n. Where applicable, provide a complete and current BMS site inventory for all existing field and supervisory controllers to be integrated into the new BMS including manufacturer, model number, firmware version, available updates, battery condition, integrations, controlled equipment, and point counts.~~

~~o. Site inventory shall be provided on a separate, new USB compatible flash drive.~~

~~1.P~~1.G Record Documentation

1. Operation and Maintenance Manuals.
   a. Three (3) copies of the Operation and Maintenance Manuals shall be provided to the Owner's Representative upon completion of the project. The entire Operation and Maintenance Manual shall be furnished on USB Flash Drive, and include the following for the BMS provided:

- Table of contents
- As-built system record drawings. Computer Aided Drawings (CAD) record drawings shall represent the as-built condition of the system and incorporate all information supplied with the approved submittal.
- Manufacturer's product data sheets or catalog pages for all products including software
- System Operator's manuals
- Archive copy of all site-specific databases and sequences
- BMS network diagrams
- Interfaces to all third party products and work by other trades

b. The Operation and Maintenance Manual shall be self-contained, and include all necessary software required to access the product data sheets. Include a logically organized table of contents. Viewer software shall provide the ability to display, zoom, print, and search all documents.

2. On-Line documentation: After completion of all tests and adjustments the contractor shall provide a copy of all as-built information and product data to be installed on a customer designated computer workstation or server.

~~1.Q~~1.H Warranty

1. Standard Material and Labor Warranty:
   a. Provide a one-year labor and material warranty on the BMS.
   b. If within twelve (12) months from the date of acceptance of product, upon written notice from the owner, it is found to be defective in operation, workmanship or materials, it shall be replaced, repaired or adjusted at the option of the BMS Contractor at the cost of the BMS Contractor.
   c. Maintain an adequate supply of materials within 100 miles of the Project site such that replacement of key parts and labor support, including programming. Warranty work shall be done during BMS Contractor's normal business hours.

Part 2 – Products

2.A General Description

1. The BMS shall use an open architecture and fully support a multi-vendor environment. To accomplish this effectively, the BMS shall support open communication protocol standards and integrate a wide variety of third party devices and applications. The system shall be designed for use on the Internet, or intranets using off the shelf, industry standard technology compatible with other owner provided networks.
2. The BMS shall consist of the following:
   a. Utilization of Existing Application and Data Server ~~EDIT THIS OUT IF ENGINE ONLY PROJECT~~
   b. ~~Remote c~~Cellular connection from a temporary construction server to ~~a temporary~~the construction BMS automation network
   c. Network Engine(s)
   d. Equipment Controller(s)
   e. Input/Output Module(s)
   f. Local Display Device(s)
   g. Portable Operator's Terminal
   h. Mobile User Interface
   i. Other components required for a complete and working BMS
3. The system shall be modular in nature, and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, controllers and operator devices, while re-using existing controls equipment.
4. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution.

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a. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.

b. The System shall maintain all settings and overrides through a system reboot.

5. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution.

6. The System shall comply with the following International Code Council (ICC) Codes:

a. Building Officials and code Administrators International (BOMA) model code

b. International Conference of Building Officials (ICBO) model code

c. Southern Building Code Congress International (SBCCI) regulations

7. Acceptable Manufacturers

a. Johnson Controls, Metasys (Factory Branch only – no exceptions)

~~b. LIST OTHER MANUFACTURERS AS REQUIRED~~

~~2.C~~2.B BMS System Architecture

1. Automation Network

a. The automation network shall be based on a IT industry standard of Ethernet TCP/IP and shall be maintained during project construction. ~~-~~Where used, LAN controller cards shall be standard "off the shelf" products available through normal PC vendor channels.

b. The BMS shall network multiple user interface clients, application and data servers, network engines, system controllers and application-specific controllers including but not limited to:

i. Utilization of Existing Application and Data Server ~~EDIT THIS OUT IF ENGINE ONLY SITE~~

ii. Network Engines

iii. Network Control Engines

iv. Equipment Controllers

v. VAV Box Controllers

vi. Third Party BACnet controllers and peripheral devices with compatibility listed by BACnet International

c. All BMS devices on the automation network shall be capable of operating at a minimum communication speed of 100 Mbps, with full peer-to-peer network communication.

d. Network Security – To protect the BMS from unauthorized users and computer hackers the Automation Network shall support HTTPS with TLS 1.2 between components, including the Application and Data Server, Network Engines, and Mobile User Interface. Self-signed certificates are installed on supported products, with the option of configuring trusted certificates. Computing devices supplied by the BMS vendor will automatically shut down unused ports to deter unauthorized access. Shall be maintained during project construction.

~~NOTE: EDIT ITEM e BELOW AS REQUIRED IF JCI IS TO PROVIDE THE AUTOMATION NETWORK IN LIEU OF THE OWNER~~

~~f.~~e. The automation network will be compatible with other enterprise-wide networks. Automation network components of the BMS shall be connected to the Owner's IT network and share resources with it by way of standard networking devices and practices provided by the Owner.

i. Owner shall provide and maintain all infrastructure components for the Automation network, including switches, routers, firewalls, VPNs etc.

ii. All data drops and IP addresses to and for BACnet IP components of the BMS shall be provided by the Owner.

iii. ~~A temporary wireless connection to Construction~~the Aautomation Nnetwork ~~-~~ shall be established for the duration of the construction cycle. ~~as further defined in Part 2.~~

i. The BMS contractor shall provide the necessary infrastructure for a ~~A~~ temporary ~~Ethernet~~ automation network ~~shall be installed by the BMS contractor~~ connecting

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all ~~engines~~ supervisory devices back to the automation server~~together~~ during ~~this temporary~~the project construction.

ii. It shall follow all rules and security listed in the automation network specification.

iii. ~~period until~~Once the Owner's IT network is installed and commissioned~~.~~ ~~a~~ ~~P~~permanent data drop~~s~~ to the construction automation network ~~all engines shall~~ shall then be installed by the Owner ~~and the~~making the construction automation network part of the permanent network system~~temporary Ethernet automation network~~. ~~shall be de-commissioned.~~

2. Temporary Cellular Connection

a. The BMS shall be provided with a temporary connection for the duration of the project via a factory installed wireless modem whereby the Construction Automation network can be accessed remotely before the Owner's IT network is operational.

b. The modem shall communicate with a temporary Automation Data Server which shall be used to remotely load graphics, generate and load database, program, commission and demonstrate the BMS

i. The costs of the temporary server shall be included within this contract at no additional cost to the Owner

c. A one year cellular contract shall be included within this contract at no additional cost to the Owner.

i. Multiple cellular services shall be made available to choose from to allow for best connection strength at the jobsite.

d. This project shall include at least one connected engine

i. The connected engine shall be a factory supported product of the BMS manufacturer.

ii. Non-standard or custom applications are not acceptable.

iii. This connected engine shall be panel mounted with a cellular modem, remote antenna and antenna cables, 5 port Ethernet switch, and a power supply with convenience outlet.

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~~2.~~3. ~~Control~~ Network (Field Controller (FC) Bus)

a. Network Engines shall provide supervisory control over the control network and shall selectively support the following communication protocols:

i. BACnet Standard Master-Slave/Token-Passing (MS/TP) Bus Protocol ASHRAE SSPC-135:

a) The Network Engines shall be BTL listed/certified.

b) The Network Engines shall be tested and certified as a BACnet Building Controller (B-BC) profile.

~~ii. The Johnson Controls N2 Field Bus- EDIT THIS OUT IF THIS PROJECT IS NEW CONSTRUCTION. LEAVE IN IF NEW ENGINES TIE TO EXISTING N2 NETWORKS~~

~~iii.~~ii. Modbus® TCP and RTU

b. New Control networks shall provide either "Peer-to-Peer", Master-Slave, or Supervised Token Passing communications, and shall operate at a minimum communication speed of 9600 baud.

c. Default control network communication protocol for this project shall be BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135.

d. A BACnet Protocol Implementation Conformance Statement (PICS) shall be provided for each controller device (master or slave) that will communicate on the BACnet MS/TP Bus as part of the submittals.

e. The FC Bus shall support communications between the CGMs and the Network Engine.

f. The FC Bus shall also support peer-to-peer communications between non-supervisory devices, allowing these devices to communicate system data with each other directly, bypassing the supervisory network engine on the bus.

g. The FC Bus shall support a minimum of 100 equipment controllers and/or expansion modules in any combination.

h. The FC Bus shall operate at a maximum distance of 15,000 Ft. between the CGM and the furthest connected device.

3.4. Dedicated Communications Networks (Sensor Actuator (SA) Bus)

a. General Purpose and VAV box controllers can expand their point capacities and communicate with specialized field devices via the SA Bus dedicated to the controller.

b. The SA Bus shall be a MS/TP Bus supporting BACnet Standard Protocol SSPC-135.

c. Device capacity per SA bus shall not be less than nine devices.

4.5. Integration

Note: Select Integration option(s) that meet project requirements

b.a. Hardwired

i. Analog and digital signal values shall be passed from one system to another via hardwired connections.

ii. There will be one separate physical point on each system for each point to be integrated between the systems.

c.b. Direct Protocol (Integrator Panel)

i. The BMS system shall include appropriate hardware equipment and software to allow bi-directional data communications between the BMS system and third party manufacturers' control panels. The BMS shall have the ability to receive, react to, and return information from multiple building systems, including but not limited to the chillers, boilers, variable frequency drives, power monitoring system, and medical gas.

ii. All data required by the application shall be mapped into the Network Engine's database, and shall be transparent to the operator.

iii. Point inputs and outputs from the third party controllers shall have real-time interoperability with BMS software features such as: Control Software, Energy Management, Custom Process Programming, Alarm Management, Historical Data and Trend Analysis, Totalization, and LAN Communications.

d.c. BACnet Protocol Integration – BACnet

i. The neutral protocol used between systems will be BACnet IP and comply with the ASHRAE BACnet standard 135.

ii. A complete Protocol Implementation Conformance Statement (PICS) shall be provided for all BACnet system devices.

iii. The ability to command, share point object data, change of state (COS) data and schedules between the host and BACnet systems shall be provided.

iv. 3rd party systems to be integrated shall provide necessary BACnet protocol hardware and software to enable integration at no cost to the BMS Contractor. These systems' manufacturers/distributors shall coordinate with the BMS Contractor to assure functional integrations in advance of final project completion.

2.D2.C User Interface

1. Dedicated Web Based User Interface

a. The BMS Contractor shall provide and install a personal computer for command entry, information management, network alarm management, and database management functions. Real-time control functions, including scheduling, history collection and alarming, shall be resident in the BMS Network Engines and Data Server to facilitate greater fault tolerance and reliability.

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b. Dedicated User Interface Architecture – The architecture of the computer shall be implemented to conform to industry standards, so that it can accommodate applications provided by the BMS Contractor and by other third party applications suppliers, including but not limited to Microsoft Office Applications. Specifically, it must be implemented to conform to the following interface standards.

i. Edge or Google Chrome or Safari for user interface functions.

ii. Microsoft Office Professional for creation, modification and maintenance of reports, sequences other necessary building management functions.

iii. Microsoft Outlook or other e-mail program for supplemental alarm functionality and communication of system events, and reports.

iv. Required network operating system for exchange of data and network functions such as printing of reports, trends and specific system summaries.

c. PC Hardware/Software – The personal computer(s) shall be configured as specified in the Computing Hardware and Software section.

d. Provide one operational device as herein specified and located on plans.

2. Mobile, Web Based, User Interface (MUI) ~~DELETE THIS SECTION IF ENGINE-ONLY SITE~~

a. General

i. All functionality as outlined within this section shall be provided as a standard catalog product software suite from the BMS manufacturer. Custom functionality development to meet these requirements is not acceptable.

ii. The mobile, web-based, user interface shall be HTML5-compliant and provide access to the system from smartphones, tablets, portable and desktop computers. User Interfaces that require software installation on the client device (e.g. Java, MicrosoftSilverlight®, Adobe® Flash®), or software downloads from an online app store shall not be acceptable for these purposes.

iii. The mobile user interface shall provide system operators with a simple space/zone/location-based navigation approach to finding information, including the ability to search for any location by name and to bookmark a location in a standard browser.

iv. The mobile user interface shall organize and display information using customer specific locations and spaces. At a minimum, the user interface shall provide:

- Organization of all space, equipment and point information in a familiar way (using standard equipment names and location descriptions), reducing the need for extensive training prior to use.
- A navigation mechanism or tree for users to select the specific location or space for accessing information – only spaces and locations in the navigation tree or equipment serving that space, nothing more.
- The ability to search for and/or bookmark any location, space, or equipment by name for quick access to critical or troublesome areas.
- Application of the same navigation mechanisms across any client device (e.g. Smart phone, tablet, personal computer) for consistency and ease of use.

v. The same user interface elements shall be accessible from any type of personal computer or mobile device running any type of operating system supported (e.g. iOS, Android, Windows®). It shall automatically adapt and optimize the display for the screen size and touch screen navigation.

b. Navigation Trees

i. A dedicated location based navigation tree shall be provided as part of the user interface in order to navigate to specific places within the facility on a hierarchical basis (typ. Campus, Facility, Building, Wing, Floor, Room.)

ii. The location-based tree shall use place names familiar to the operator without training or familiarization regarding special codes and conventions utilized in the generation of the BMS.

iii. Clicking or tapping on a location name in the tree shall display the home page associated with the space and simultaneously expand the tree to display the next level of spaces below the one selected.

iv. Provide a means for qualified users to view an all hardware items navigation tree of devices connected to the BMS network in order to enable troubleshooting of equipment and communications.

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v. A click or tap on a device in the network tree shall display a dashboard for that device including information regarding related equipment and access to a separate focus view of commandable points associated with the piece of hardware. A click or tap on such a point shall display a control dialogue box allowing the user to modify or command that point as indicated. The dialog box shall contain an annotation box for describing why the action was taken or special circumstances that apply.

vi. Specific hardware and software types in the Network tree shall also include access to one or more the following views in their dashboard depending on hardware type or network element (e.g. MS/TP trunk):

- Summary View
- Diagnostic View
- Network View
- Trend View

vii. Provide a means to hide the Network Tree and return to the Spaces Tree at any time by clicking on the Spaces Icon above the tree.

viii. Provide a means to restrict user access to any space in the Spaces Tree and thereby prevent manipulation of equipment associated with the space.

c. Dashboard Displays

i. The user interface shall provide the ability to view equipment visualizations, floor plans, and/or other graphics on mobile or desktop client devices in a browser environment, without the need for additional plugins or software. Graphics shall be accessible via a space (for floorplans, campus maps, etc.) or equipment dashboard.

ii. Standard dashboards shall be configured for each defined space including one of the following predefined or custom elements:

- Equipment Serving Space
- Potential Problem Areas
- Equipment Summary
- Graphic Display (if specified)
- Schedule

iii. Standard dashboards shall be configured for each system or device (typ. mechanical or electrical equipment) including the following predefined or custom elements:

- Trend
- Equipment Activity Summary
- Equipment Relationships Summary
- Equipment Data
- Graphic Display
- Schedule

iv. Users with appropriate permissions shall have access to a Dashboards Manager that can change the display order of Summaries and Data elements, add or remove elements and apply custom dashboards layouts to equipment and space by type.

v. Dashboard Manager shall apply dashboards to spaces or equipment based on the viewing platform (Desktop/Tablet or Phone) in order to tailor the user experience to the needs of the specific user base.

vi. Default dashboard displays by space and equipment type shall be created per the guidelines in this specification or by mutual agreement with the Owner's representative.

d. Alarm Management

i. The user interface shall provide a single display of all potential issues in a facility including items currently in alarm, warning, override, out-of-service and offline.

ii. The user interface shall provide notification of new alarms, visually and audibly.

iii. The user interface shall provide the ability to view a summary of alarms, including a chart of the number of alarms in each of the defined alarm priority ranges. The priority ranges should be filterable.

iv. The user interface shall provide the capability to view multiple occurrences of the same alarm, ultimately providing the ability to acknowledge or discard all occurrences of the alarm in a single action.

v. The user interface shall provide the capability to view, and filter on, all alarms present in a well-defined mechanical system using the equipment serving equipment relationships.

vi. The user interface shall provide the capability to acknowledge and discard all occurrences of at least 1000 alarms in one operation.

vii. The user interface shall provide the user with the understanding of what physical space is being affected when an alarm occurs. The user interface shall provide the ability to filter alarms by physical space affected when the alarm occurred.

viii. The user interface shall provide the capability to monitor alarms 24/7 without requiring an active login to the system, accessible via segregated web page. The user interface shall provide the capability to enabled or disable the 24/7 alarm monitor mode if desired.

ix. The user interface shall provide the capability to annotate alarms using a pre-defined selection list or by providing custom text.

x. The user interface shall provide the capability to filter down alarm list and bookmark the filtered list, allowing automatic filtering to be applied when the bookmark is accessed.

xi. Provide a means to export a .csv or .pdf copy of the currently displayed alarm list.

xii. Provide a means to set up an alarm escalation feature. If an alarm is not acknowledged or discarded by recipients within a user-selected time, the alarm shall be escalated to an additional set of recipients.

e. Send Announcement

i. Administrative users should have the ability to alert staff of planned outages in advance. The communication avenues should include:

- Email
- A message shown on the login screen
- A banner shown to logged in users

f. Equipment Activity Summary

i. The user interface shall provide a filterable, single display, of all activity related to a specific piece of equipment including user changes, discarded user changes, pending alarms, discarded alarms, and acknowledged alarms for at least one year of historical data.

ii. Items shall be listed in timed order with the latest activity at the top of the list.

iii. Filters shall allow only specific activities for specific data points occurring within a specific time and date window to be displayed.

iv. Provide a means to export a .csv copy of the currently displayed summary by clicking or tapping on the export icon.

v. Provide a means to create a custom trend graph containing the data shown in the currently displayed summary by tapping or clicking on the trend icon in the header bar and selecting the specific points to trend in the resulting selection panel.

vi. Clicking on the information icon in front of any displayed activity listed in the summary shall expand the display to include the name of the user, server time, value prior to the activity, the ability to annotate the activity and a user selectable icon for displaying a trend graph of the point.

g. Equipment Relationships Summary

i. The user interface shall provide a summary of all equipment and spaces related to the operation of the system or device currently selected for viewing.

ii. The user interface shall include the capability to navigate to the home page of any related piece of equipment or space with a single click or tap on the desired element.

h. Equipment Data Summary

i. The user interface shall provide a summary of all data pertaining to a particular piece of mechanical or electrical equipment in a tabular format. Clicking or tapping on any value in the summary shall display a related command panel allowing the user to command, override, or change service condition of the point selected and to annotate such actions for future reference.

ii. Provide a means to export a .pdf copy of the report with a single click on the associated export icon.

i. Equipment Serving Space Summary

i. The user interface shall provide a summary of all mechanical and electrical equipment as defined in the points list that serves a selected space from the navigation tree.

ii. The summary shall be capable of including a subset of the viewable points for each system representing the key elements of interest to operators without subjecting them to long lists of points irrelevant to basic operation.

iii. Clicking or tapping on any item in the summary shall navigate to the item's assigned home page in the user interface.

iv. Provide a means to view a custom trend of information contained in the summary with a single click of the trend icon residing in the title header.

v. Provide a means to display specific systems and points by filtering equipment types desired.

vi. Because the data is intended to be a snapshot of the current conditions in the space it shall not dynamically update but a click or tap on the update icon at any time performs that function.

j. Potential Problem Areas Summary

i. The user interface shall provide a summary of all points in the system related to the space that are not operating correctly (e.g. alarm, off normal or not communicating correctly) in order to provide the operator with a quick update on current conditions.

ii. The information shall include:

- Point status (via color)
- Point name
- Value of the point when the summary was taken
- Equipment that contains the offending point
- Space that is served by that equipment

iii. Data points in the summary may be filtered by one or more types of off-normal condition (e.g. above setpoint, offline and overridden).

iv. The summary may be exported in .csv format for inclusion in spreadsheets or other documents.

k. Equipment Summary

i. The user interface shall provide a summary that allows the user to compare all similar equipment that serves the space as well as downstream (child) spaces in order to evaluate conditions quickly and determine patterns for troubleshooting purposes.

ii. Each unique equipment type shall be selectable and display a representative set of values along with the space(s) being served by the device. Equipment types can be selected from a dropdown menu in the summary.

iii. Clicking or tapping on a selected device in the summary shall navigate to the home page for that piece of equipment while clicking or tapping a data point shall display the command panel for that point.

iv. Provide a means to export a .pdf copy of the currently displayed summary by clicking or tapping on the export icon.

v. Provide a means to create a custom trend graph containing the data shown in the currently displayed summary by clicking on the trend icon in the header bar and selecting the specific points to trend in the resulting selection panel.

vi. Provide a means to sort data within the summary by clicking on the desired column heading, allowing to sort from lowest to highest value or vice versa.

vii. Provide a means to edit the column types and column order within the summary to provide relevant information in accordance with Operators' preferences.

viii. Provide a means to link to an advanced search and reporting function directly from the Equipment Summary that will pre-populate the advanced report with the data from the Equipment Summary.

l. User Defined Summaries

i. Provide the capability to view, command, and modify large quantities of similar data in summaries without the use of a secondary application (e.g. a spreadsheet). These summaries shall be generated automatically or user defined.

m. Trend

i. The user interface shall provide the capability to view historical trend data from multiple pieces of equipment in both bar and line formats.

ii. The user shall have the ability to navigate to a selection list of frequently viewed trends.

iii. Trend graphs shall have to ability to be smartly auto-generated based on equipment and space relationships.

iv. The user shall have the ability to view up to 3 graphs of differing units of measurement in a single screen and select which data points to plot on each to help with readability.

v. Each graph shall include a dedicated selection icon to export a copy of the graphic and data in .pdf format or the data only as a .csv file.

vi. Trend graphs shall allow the plotting of non-trended point's default values.

vii. The user shall have the ability to add any trended to point a custom trend graph.

viii. The user shall have the ability to save trend graphs for reference later.

ix. The user shall be able to specify the duration of time and aggregation period for each trend line.

x. The user shall have the ability to decide whether to show raw or aggregate trend data.

n. Operator Access

i. The user interface shall provide the ability to segment access to building data based on the space(s) or location(s) the user is physically located in and/or manages. The user interface shall provide the capability to assign "inherited" space permissions and the ability to assign user's space based access in bulk.

ii. The user interface shall provide the ability to segment access to building data based on the space(s) or location(s) the user is physically located in and/or manages. The user interface shall provide the capability to assign "inherited" space permissions and the ability to assign user's space based access in bulk.

o. Graphics

i. The user interface shall display an equipment visualization or graphic within the context of its associated space (building, floor, room, etc.) or equipment dashboard per SIUE current standards and owner direction.

ii. Graphics shall include the ability to define individual information layers for operator selection in order to clarify systems status and simplify operation on mobile devices. Where desired a master layer may be defined to include important information about the facility on all graphic screens.

iii. Graphics shall support the use of photo-realistic symbols as well as color change and animation to match the status of the related system control point.

iv. Provide a means to export a time stamped .pdf file of the graphic being viewed in order to communicate the current conditions in the space or the equipment being viewed and to provide a historic record.

v. An integral graphic manager shall be provided including the following features and capabilities:

- Creation and modification of graphics from any HTML5 capable browser without the need for additional plug-ins or software packages.
- Access to a full suite of pre-defined templates for air and water sourced HVAC applications as well as the ability to add custom templates as created for other use. Pre-aliased graphic templates may be defined and saved for repetitive representations of common mechanical and electrical equipment.
- A full suite of pre-defined three dimensional symbols for mechanical and electrical systems as well as all line, text and shape tools required for integration into a graphic with zoom and pan capabilities on multiple platforms and in multiple browsers.
- The ability to search and replace items in multiple graphics with a single command.
- The ability to import and insert photos and images into the graphic.
- The ability of the graphics manager to create and edit graphics including the ability to bind graphic elements to the values and conditions of system points in both an on-line and off-line mode.
- The ability to create and import custom SVG symbols that can be selectable from the graphical palette and rendered at runtime.

vi. As required, the BMS Contractor shall provide software licenses in the name of the owner for programming, configuration and graphics building tools to allow designated representatives to make changes, modifications or additions to the system. While future updates or revisions may require an update fee, the owner shall incur no additional cost if they choose not to update. Systems that require any annual or time-limited licensing fees shall not be permitted.

p. Scheduling

i. The user interface shall provide the capability to display, in a singular view, all of the effective schedules in the context of the space (building/floor/room, etc.) or equipment that the schedule effects. The software should have the ability to display an effective schedule, for the present, or a future date.

ii. The user interface shall provide a report of all schedules affecting a space or equipment. The report shall provide the user details of events that comprise the weekly schedule and exception schedule(s). The report shall provide a means of viewing individual breakout scheduling elements for Weekly Schedule, Exceptions and Default Commands.

iii. The user interface shall provide the capability to efficiently change or modify schedules in mass quantities. This includes the capability to add, in bulk, exceptions to schedules, in addition to assigning, in bulk, weekly schedules.

q. Command and Control

i. Provide a means to command system analog and binary points via a dropdown menu accessed by clicking or tapping on the value shown in any equipment summary or graphic display and completing the task in the resultant menu including an optional annotation.

ii. Commanding multiple points shall be possible on displays where multiple like system elements can be chosen.

iii. The user interface shall support users adding notes on their commands.

iv. The user interface shall support a choice of either permanent or temporary commands.

r. Cyber Health Dashboard

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i. The Cyber Health Dashboard shall provide a centralized view of potential cybersecurity related issues or system issues, grouped into critical issues, potential risks, and informational items.

ii. The Cyber Health Dashboard shall identify user account information, including:

a. Total number of users

b. Dormant users

c. Active users

d. Locked users

e. Temporary users

f. Disabled users

g. Users with Administrator role

h. Policy related information

iii. The Cyber Health Dashboard shall indicate out-of-date software.

iv. The Cyber Health Dashboard shall identify when security certificates are set to expire.

v. The Cyber Healthy Dashboard shall provide insight into user activity such as number of successful logins, unsuccessful logins, and locked out accounts.

s. Involvement

i. The user interface shall provide in a single screen, a way to visualize all interactions (I.e. - commands, writes, references) with a single object.

ii. The interface shall provide the ability to filter out any interactions (i.e. commands, writes, references) that are not pertinent.

iii. The user interface shall allow seamless navigation between one object's Involvement view to another object's.

t. System-level Activity

i. The user interface shall provide a timeline view of all audits that occur in the system, including:

a. Logins attempts with user specified

b. Add, delete, modification of objects

c. Commands

u. Search

i. Typing a text string in the Search box shall display a list of all occurrences of that string in the mobile user interface. When a string is represented in the description of a space or network element, selecting it shall display its default dashboard.

ii. Clicking or tapping on the Advanced Search Icon shall display the Advanced Search dialog box permitting the following:

- Search by Space and Equipment, Equipment Definition or Network Reference
- Filter the search by wildcard name or object type
- Multi-selection of objects for commanding or the creation of reports including Trend, Alarm, Audit and Activity for a specific period of time
- Creation of reports in PDF or CSV formats which can be instantaneously downloaded or emailed, or scheduled to be sent at Operator-selected intervals (daily/weekly/monthly)

v. Software Updates

i. Users shall be notified when new software becomes available for download.

ii. Users shall be given brief information on what's to be expected in the update.

w. Offline Operation

i. The mobile user interface shall have the ability to operate in an offline mode in order to create or edit graphics and dashboard elements.

ii. Content created offline shall be available to all authorized users for inclusion of an operating user interface later.

x. Fault Detection

i. Fault detection functionality shall be provided that identifies and displays building system-related faults and lists them color coded in order of severity. This software shall leverage defined rules and a semantic data model to ease configuration.

- The building system fault engine shall run periodically against a minimum of seven days of historical data.

y. Fault Triage

i. Provide a means to display additional information on a particular fault along with corrective actions in the order of their likeliness to resolve the issue, a description of the fault, charting of supporting data, and an activity log to track progress of triage attempts. Functionality shall enhance the sorting order and information in the Faults display to introduce fault occurrences and durations to better drive the most problematic issues to the top of the list.

3. Associated Application Components

z. Security/Passwords

i. Multiple-level passwords access protection shall be provided via roles and permissions. The feature will allow the system to base access on a user's job title or role and allow the user/manager access interface control, display, and database manipulation capabilities based on an assigned password.

ii. Roles may be copied and altered to meet specific roles and permissions based on the particular policies.

iii. The system shall allow each user to change his or her password at will.

iv. When entering or editing passwords, the system shall not echo the actual characters for display on the monitor.

v. A maximum of 150 categories may be used to determine or assign areas of responsibilities to each user account.

vi. A minimum of 100 unique passwords shall be supported.

vii. Operators shall be able to perform only those commands available for their respective passwords. Display of menu selections shall be limited to only those items defined for the access level of the password used to log-on.

viii. Operators shall be further limited to only access, command, and modify those buildings, systems, and subsystems for which they have responsibility. Provide a minimum of 100 categories of systems to which individual operators may be assigned.

ix. The system shall automatically generate a report of log-on/log-off and system activity for each user.

x. The system shall have the ability to provide a Department of Defense (DoD) specific warning banner for applicable sites that warns the user they are accessing a restricted site.

xi. After successful login the last time and date that user name was previously logged in is shown on the screen.

xii. Each login attempt is recorded in the system Audit Log with the option to record the IP address of the PC that made the login.

aa. Screen Manager

i. The system will allow a customized image on the login screen (e.g. organization name, logo).

ii. User View navigations can be displayed as either a set of tabs or a drop down list.

iii. Allows user preference for assigning of a background color for when an object is Out of Service which will enable the operator to quickly distinguish points that have been commanded to this state.

iv. The User Interface shall be provided with screen management capabilities that allow the user to activate, close, and simultaneously manipulate a minimum of 4 active display windows plus a network or user defined navigation tree.

bb. Historical trending and data collection

i. Each Network Engine shall store trend and point history data for all analog and digital inputs and outputs, as follows:

- Any point, physical or calculated, may be designated for trending. Two methods of collection shall be allowed:
  a) Defined time interval
  b) Upon a change of value
- Each Network Engine shall have the capability to store multiple samples for each physical point and software variable based upon available memory, including an individual sample time/date stamp. Points may be assigned to multiple history trends with different collection parameters.

~~Note: Edit next paragraphs ii and iii to reflect system configuration~~

~~iii.~~ii. Trend and change of value data shall be stored within the engine and uploaded to a dedicated trend database or exported in a selectable data format via a provided data export utility. Uploads to a dedicated database shall occur based upon one of the following: user-defined interval, manual command, or when the trend buffers are full. Exports shall be as requested by the user or on a time-scheduled basis.

~~iv.~~iii. The system shall provide a configurable data storage subsystem for the collection of historical data. Data can be stored in SQL database format.

~~v.~~iv. The system shall provide data to enable optimization capabilities including fault detection and diagnostics, advanced analytics and central plant optimization without the need of a gateway or additional hardware.

cc. Database Management

i. Where a separate SQL database is utilized for information storage the System shall provide a Database Manager that separates the database monitoring and managing functions by supporting two separate windows.

ii. Database secure access shall be accomplished using standard SQL authentication including the ability to access data for use outside of the Building Automation application.

iii. The database managing function shall include summarized information on trend, alarm, event, and audit for the following database management actions:

- Backup
- Purge
- Restore

iv. The Database Manager shall support four tabs:

- Statistics – shall display Database Server information and Trend, Alarm (Event), and Audit information on the Databases.
- Maintenance – shall provide an easy method of purging records from the Server trend, alarm (event), and audit databases by supporting separate screens for creating a backup prior to purging, selecting the database, and allowing for the retention of a selected number of day's data.
- Backup – Shall provide the means to create a database backup file and select a storage location.
- Restore – shall provide a restricted means of restoring a database by requiring the user to log into an Expert Mode in order to view the Restore screen.

v. The Status Bar shall appear at the bottom of all Database Manager Tabs and shall provide information on the current database activity. The following icons shall be provided:

- Ready
- Purging Record from a database
- Action Failed
- Refreshing Statistics
- Restoring database
- Shrinking a database
- Backing up a database
- Resetting internet information Services
- Starting the Device Manager
- Shutting down the Device Manager
- Action successful

vi. The Database Manager monitoring functions shall be accessed through the Monitoring Settings window and shall continuously read database information once the user has logged in.

vii. The System shall provide user notification via taskbar icons and e-mail messages when a database value has exceeded a warning or alarm limit.

viii. The Monitoring Settings window shall have the following sections:

- General – Shall allow the user to set and review scan intervals and start times.
- Email – Shall allow the user to create and review e-mail and phone text messages to be delivered when a Warning or Alarm is generated.
- Warning – shall allow the user to define the Warning limit parameters, set the Reminder Frequency, and link the e-mail message.
- Alarm – shall allow the user to define the Alarm limit parameters, set the Reminder Frequency, and link the e-mail message.
- Database login – Shall protect the system from unauthorized database manipulation by creating a Read Access and a Write Access for each of the Trend, Alarm (Event) and Audit databases as well as an Expert Mode required to restore a database.

ix. The Monitoring Settings Taskbar shall provide the following informational icons:

- Normal – Indicates by color and size that all databases are within their limits.
- Warning – Indicates by color and size that one or more databases have exceeded their Warning limit.
- Alarm – Indicates by color and size that one or more databases have exceeded their Alarm limit.

x. The System shall provide user notification via Taskbar icons and e-mail messages when a database value has exceeded a warning or alarm limit.

dd. Demand Limiting and Load Rolling

i. The System shall provide a Demand Limiting and Load Rolling program for the purpose of limiting peak energy usage and reducing overall energy consumption and shall be implemented as outlined within the sequences of operations.

~~2.E~~2.D Network Engines ~~DELETE THIS SECTION IF ONLY SNCs WILL BE USED~~

1. General

a. The Network Engine shall be a fully user-programmable, supervisory controller. The Network Engine(s) shall monitor the network of distributed equipment controllers, provide global strategy and direction, and communicate on a peer-to-peer basis with other Network Engine(s).

b. Automation network – The Network Engine(s) shall reside on the automation network and shall support a subnet of system controllers.

c. Connected Engine - This connected control engine shall be panel mounted with a cellular modem, remote antenna and antenna cables, 5 port Ethernet switch, and a power supply with convenience. outlet

i. The connected control engine shall be a standard catalog product of the BMS manufacturer.

ii. Non-standard or custom applications are not acceptable

d. User Interface – Each Network Engine shall have the ability to deliver a web-based User Interface. All computers connected physically or virtually to the automation network shall have access to the web-based user interface.

~~b.~~

~~b. Automation network temporary cellular connection – The BMS shall be provided with a temporary connection via a "master" engine whereby the Automation network and connected "slave" engines can be accessed remotely before Owner's IT network is operational. This project shall include at least one connected engine.~~

~~i. The connected engine shall be a standard catalog product of the BMS manufacturer. Non-standard or custom applications are not acceptable.~~

~~ii. This connected engine shall be panel mounted with a cellular modem, remote antenna and antenna cables, 5 port Ethernet switch, and a power supply with convenience outlet.~~

~~iii. The "master" engine shall communicate with a temporary Automation Data Server which can be used to remotely load graphics, generate and load database, program, commission and demonstrate the BMS.~~

~~iv. A one year cellular contract shall be included within this contract at no additional cost to the Owner. Multiple cellular services shall be made available to choose from to allow for best connection strength at the jobsite. The costs of the remote server shall be included within this contract at no additional cost to the Owner.~~

~~h. User Interface – Each Network Engine shall have the ability to deliver a web-based User Interface. All computers connected physically or virtually to the automation network shall have access to the web-based user interface.~~

~~i.~~e. Processor – The Network Engine(s) shall be microprocessor-based with a minimum word size of 32 bits. The Network Engine(s) shall be a multi-tasking, multi-user, and real-time digital control processor. Standard operating systems shall be employed. Network Engine(s) size and capability shall be sufficient to fully meet the requirements of this Specification.

~~j.~~f. Memory – Each Network Engine shall have sufficient memory to support its own operating system, databases, and control programs, and to provide supervisory control for all control level devices.

~~k.~~g. Secure Boot – The Network Engine(s) shall prevent malicious or unauthorized software applications from loading during the system startup process.

~~l.~~h. Background File Transfer – The Network Engine shall provide the capability to download a new image and database to a network engine while the engine is still running and controlling the building.

~~m.~~i. User Authentication – The Network Engine(s) shall support local user authentication.

~~n.~~j. Password Security – Access to the Network Engines' embedded user interface shall require a password of 8 to 50 characters including a minimum of one lower case letter, one upper case letter, one number, and one special character. An alarm shall be generated after three unsuccessful attempts within 15 minutes, and the user shall be denied access until permission is renewed by a system administrator.

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o.k. Network Security – Communication between the Network Engine and other system networked devices including additional Network Engines, Application and Data Servers, Open Data Servers (BACnet listed OWS), and user interface clients shall be encrypted and support HTTPS with Transport Level Security (TLS) Version 1.2. Self-signed certificates are to be provided with the option of configuring trusted certificates. Engines shall also be equipped to optionally support FIPS 140-2 Federal Government encryption standard.

p.l. Hardware Real Time Clock – The Network Engine(s) shall include an integrated, hardware-based, real-time clock, with a supercapacitor to maintain time for a minimum of 72 hours during a power loss. Controllers using a battery to maintain time during a power loss shall not be acceptable.

q.m. Diagnostics – The Network Engine(s) shall continuously perform self-diagnostics, communication diagnosis, and diagnosis of all panel components. The Network Engine(s) shall provide both local and remote annunciation of any detected component failures or repeated failures to establish communication.

r.n. Power Failure – In the event of the loss of normal power, the Network Engine(s) shall continue to operate for a user adjustable period of up to 10 minutes after which there shall be an orderly shutdown of all programs to prevent the loss of database or operating system software.

i. During a loss of normal power, the control sequences shall go to the normal system shutdown conditions. All critical configuration data shall be saved into Flash memory.

ii. Upon restoration of normal power and after a minimum off-time delay, the controller shall automatically resume full operation without manual intervention through a normal soft-start sequence.

s.o. Certification – The Network Engine(s) shall meet and be listed to the UL 916 Standard for Energy Management Equipment and be FCC Compliant to CFR47, Part 15, Subpart B, Class A.

t.p. Device Integration – The Network Engine(s) shall support integrating networked devices using the following communication protocols on the device/controller network:

Note: Items i, ii & iii are specifications for BACnet, LonWorks, and N2. They should remain in the specification even though all three are not required.

ii.i. Primary protocol support: The Network Engine(s) shall support BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135 on the controller network.

- The Network Engine(s) shall support Remote Field Bus integration via a BACnet IP to MS/TP router.
- The Network Engine(s) shall be tested and BTL listed/certified as a BACnet Building Controller (B-BC).
- A BACnet Protocol Implementation Conformance Statement shall be provided for the Network Engine(s).

iii.ii. The Network Engine(s) shall optionally support integration of networked devices using the following networking protocols:

- Johnson Controls N2 or third party N2 Open devices.
- LonTalk
- MODBUS RTU
- MODBUS TCP
- KNX
- M-Bus
- OPC UA

u.g. The Network Engine(s) shall include multi-color, flashing LEDs to indicate important operating conditions and status such as heartbeat, fault, Ethernet activity, Ethernet comm speed, site director status, BACnet IP message communication status, USB port usage, Control network usage.

v.r. The Network Engine shall support up to 50, 100 or 200 supervised devices across all supported integrations via flexible sizing options. Provide 20% spare capacity within installed engines for future addition of supervised devices.

w.s. Communications Ports – The Network Engine(s) shall provide the following ports for connecting networkable devices

i. Two (2) USB ports

ii. One (1) or Two (2) RS-485 ports

iii. One (1) Ethernet port

~~x.~~t. Provide Johnson Controls SNE10501, SNE11001 or SNE22001 or approved equal.

~~2.5 Network Control Engines DELETE THIS SECTION IF SNCs NOT USED~~

~~1. General~~

~~x. The Network Control Engine shall be a fully user-programmable, supervisory controller. The Network Control Engine shall monitor the network of equipment controllers, provide global strategy and direction, and communicate on a peer-to-peer basis with other Network Engines.~~

~~x. The Network Control Engine shall also be a fully user-programmable, equipment controller that includes a minimum of 28 I/O points.~~

~~x. Automation Network – The Network Control Engine(s) shall reside on the automation network and shall support a subnet system controllers via an integral Control network connection.~~

~~Connected Engine – This connected control engine shall be panel mounted with a cellular modem, remote antenna and antenna cables, 5 port Ethernet switch, and a power supply with convenience outlet~~

~~The connected control engine shall be a standard catalog product of the BMS manufacturer.~~

~~Non-standard or custom applications are not acceptable~~

~~x. Automation network temporary cellular connection – The BMS shall be provided with a temporary connection via a "master" control engine whereby the Automation network and connected "slave" engines can be accessed remotely before Owner's IT network is operational. This project shall include at least one connected control engine.~~

~~. The connected control engine shall be a standard catalog product of the BMS manufacturer. Non-standard or custom applications are not acceptable.~~

~~. This connected control engine shall be panel mounted with a cellular modem, remote antenna and antenna cables, 5 port Ethernet switch, and a power supply with convenience outlet.~~

~~. The "master" control engine shall communicate with a temporary Automation Data Server which can be used to remotely load graphics, generate and load database, program, commission and demonstrate the BMS.~~

~~. A one year cellular contract shall be included within this contract at no additional cost to the Owner. Multiple cellular services shall be made available to choose from to allow for best connection strength at the jobsite. The costs of the remote server shall be included within this contract at no additional cost to the Owner.~~

~~x. User Interface – Each Network Control Engine shall have the ability to deliver a web-based User Interface previously described. All computers connected physically or virtually to the automation network shall have access to the web-based user interface.~~

~~x. Processor – The Network Control Engine(s) shall be microprocessor-based with a minimum word size of 32 bits. The Network Control Engine shall be a multi-tasking, multi-user, and real-time digital control process. Standard operating systems shall be employed. Network Control Engine(s) size and capability shall be sufficient to fully meet the requirements of this Specification.~~

~~x. Memory – Each Network Control Engine shall have sufficient memory to support its own operating system, databases, and control programs, and to provide supervisory control for all control level devices.~~

~~x. Secure Boot – The Network Control Engine shall prevent malicious or unauthorized software applications from loading during the system startup process.~~

~~x. Background File Transfer – The Network Control Engine shall provide the capability to download a new image and database to a network engine while the engine is still running and controlling the building.~~

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x. User Authentication – The Network Control Engine shall support local user authentication.

x. Password Security – Access to the Network Control Engines' embedded user interface shall require a password of 8 to 50 characters including a minimum of one lower case letter, one upper case letter, one number, and one special character. An alarm shall be generated after three unsuccessful attempts within 15 minutes and the user shall be denied access until permission is renewed by a system administrator.

x. Network Security – Communication between the Network Control Engine and other system networked devices including additional Network Engines, Application and Data Servers, Open Data Servers (BACnet listed OWS), and user interface clients shall be encrypted and support HTTPS with Transport Level Security (TLS) Version 1.2. Self-signed certificates are to be provided with the option of configuring trusted certificates. Engines shall also be equipped to optionally support FIPS 140-2 Federal Government encryption standard.

x. Hardware Real Time Clock – The Network Control Engine shall include an integrated, hardware-based, real-time clock, with a supercapacitor to maintain time for a minimum of 72 hours during a power loss. Controllers using a battery to maintain time during a power loss shall not be acceptable.

x. Diagnostics – The Network Control Engine(s) shall continuously perform self-diagnostics, communication diagnosis, and diagnosis of all panel components. The Network Control Engine(s) shall provide both local and remote annunciation of any detected component failures or repeated failures to establish communication.

x. Power Failure – In the event of the loss of normal power, the Network Control Engine(s) shall continue to operate for a user adjustable period of up to 10 minutes after which there shall be an orderly shutdown of all programs to prevent the loss of database or operating system software.

iii. During a loss of normal power, the control sequences shall go to the normal system shutdown conditions. All critical configuration data shall be saved into Flash memory.

iii. Upon restoration of normal power and after a minimum off-time delay, the controller shall automatically resume full operation without manual intervention through a normal soft-start sequence.

x. Certification – The Network Control Engine(s) shall meet and be listed to the UL 916 Standard for Energy Management Equipment and be FCC Compliant to CFR47, Part 15, Subpart B, Class A.

x. Device Integration – The Network Control Engine(s) shall support integrating and supervising networked devices using the following communication protocols on the device/controller network:

Note: Items i, ii & iii are specifications for BACnet, LonWorks, and N2. They should remain in the specification even though all three are not required.

iii. The Network Control Engine(s) shall support BACnet Standard MS/TP Bus Protocol ASHRAE SSPC-135 on the controller network.

- The Network Control Engine(s) shall support Remote Field Bus integration via a BACnet IP to MS/TP router.
- The Network Control Engine(s) shall be tested and BTL listed/certified as a BACnet Building Controller (B-BC).
- A BACnet Protocol Implementation Conformance Statement shall be provided for the Network Engine(s).

iii. The Network Engine(s) shall optionally support integration of networked devices using the following networking protocols:

- Johnson Controls N2 or third party N2 Open devices.
- LonTalk
- MODBUS RTU
- MODBUS TCP
- KNX
- M-Bus
- OPC UA

x. The Network Control Engine shall employ a finite state programming to eliminate unnecessary conflicts between control functions at crossover points in their operational sequences. Suppliers

using non-state based DDC shall provide separate control strategy diagrams for all controlled functions in their submittals.

x. The Network Control Engine shall be factory programmed with a continuous adaptive tuning algorithm that senses changes in the physical environment and continually adjusts loop tuning parameters appropriately. Controllers that require manual tuning of loops or perform automatic tuning on command only, shall not be acceptable.

x. The Network Control Engine shall support the following types of inputs and outputs:

iii. Universal Inputs – shall be configured to monitor any of the following for Analog inputs: Voltage Mode, Current Mode, Resistive Mode. For Binary Inputs: Dry Contact Maintained Mode, Pulse Counter Mode

iii. Analog Outputs – shall be configured to output either of the following: Voltage Mode, Current Mode

iii. Binary Outputs – shall output the following: 24VAC Triac

iii. Configurable Outputs – shall be configured to output either of the following: Analog Output Voltage Mode; Binary Output 24 VAC Triac Mode

iii. The Network Control Engine shall have the ability to monitor and control a network of sensors and actuators over a Sensor Actuator (SA) Bus dedicated to the controller. This bus shall be a MS/TP Bus supporting BACnet Standard protocol SSPC-135 supporting no less than 9 devices with a maximum distance of 1,200 Ft. between the Network Control Engine and the furthest connected device.

x. The Network Control Engine shall provide removable, labeled, screw terminal blocks for 24 VAC power, communication bus and I/O point field wiring.

x. The Network Control Engine shall include the following multi-color, flashing LEDs to indicate important operating conditions and status

x. Communications Ports – The Network Control Engine(s) shall provide the following ports for connecting networkable devices:

iii. Two (2) USB ports

iii. One (1) RS-485 port

iii. Two (2) Ethernet ports

Note: Items below specify an integrated display/keypad. Remove from spec if not used on project.

x. The Network Control Engine shall support an integrated user interface featuring a display and keypad in lieu of on-board HOA switches for output overrides.

iii. The integrated user interface shall allow viewing and monitoring points, alarms, and trends.

iii. The integrated user interface shall allow viewing and changing setpoints, modes of operation, and parameters.

iii. The integrated user interface shall provide password protection with user-adjustable password timeout.

iii. The information presented by the integrated user interface shall be organized into folders for easy navigation.

iii. The integrated user interface shall support textual descriptions in English for each point.

iii. The display shall be, at minimum, a 2.4-inch, color display with 320x240 resolution.

iii. The display shall support adjustable contrast and brightness.

iii. The keypad shall include no more than seven (7) keys.

x. The Network Control Engine shall support up to 4 or 50 supervised devices across all supported integrations.

x. Provide Johnson Controls SNC or approved equal

2.RRR2.F Application and Data Server – Extension of Existing SIUE Servers DELETE THIS SECTION IF PROJECT IS AN ENGINE-ONLY SITE

1. Application and Data Server (ADS)
   a. One Application and Data Server shall be provided for this project
   b. The Application and Data Server shall be a software and hardware solution designed to manage the collection and presentation of the user interface, large amounts of trend data, event messages, operator transactions, and system configuration data on the BMS.
   c. The Application and Data Server shall act as site director for consolidating BMS information from Network Engines for integrated storage and presentation. The ADS shall not restrict access to the individual Network Engines ensuring optimal BMS accessibility in the event of individual component failure or a loss of communication.
   d. The Application and Data Server shall act as a server for the following functionality as described in these specifications:
      - Mobile user interface providing user friendly access to system information via site navigation by place or device.
      - Site Management Portal functions and applications.
      - System Configuration Tool controller configuration and programming.
   e. Network Security – Communication between the Network Engines, Application and Data Server, and user interface clients shall be encrypted and support HTTPS with Transport Level Security (TLS) Version 1.2. Self-signed certificates are to be provided with the option of configuring trusted certificates.

Note: Select number of simultaneous users in e. below

b. The Application and Data Server shall be capable of supporting up to {5 10 25 50 100} simultaneous users via Web client access.

c.a. Supported Web Client operating systems:
   i. Microsoft Windows 7, 8.1, 10 (Professional, Enterprise, Ultimate, Anniversary.)
   ii. Apple OS X 10.8, 10.9, 10.10, 10.11.

d.b. Supported Web Browsers:
   i. Google Chrome
   ii. Microsoft Internet Explorer 11
   iii. Microsoft Edge
   iv. Apple Safari 11 or later

e.c. User Authentication – The Application and Data Server shall support local, Active Directory, and Microsoft 365 authentication.

f.d. Computer shall be configured as specified in the Computing Hardware and Software section of this specification.

sss. Provide Johnson Controls M4-OAS-MS-ADS-MS-ADX or approved equal.

2.TTT2.F DDC Equipment Controllers

Note: For this following section, multiple Metasys equipment controller types are listed. Keep references to those that are appropriate for the intended project and remove references to those that are not.

2.1. General Purpose Equipment Controller
   a. The General Purpose Equipment Controller (CGM) shall be a fully programmable, digital controller that communicates via the BACnet MS/TP protocol over the FC Bus.
      i. The CGM shall support BACnet Standard ANSI/ASHRAE 135.
         - The CGM shall be BTL listed/certified.

- The CGM shall be tested and certified as a BACnet Advanced Application Controller (B-AAC).
- A BACnet Protocol Implementation Conformance Statement shall be provided for the CGM.

b. The CGM shall employ finite state programming to eliminate unnecessary conflicts between control functions at crossover points in their operational sequences. Suppliers using non-state based DDC shall provide separate control strategy diagrams for all controlled functions in their submittals.

c. CGM controllers shall be factory programmed with a continuous adaptive tuning algorithm that senses changes in the physical environment and continually adjusts loop tuning parameters appropriately. Controllers that require manual tuning of loops or perform automatic tuning on command only shall not be acceptable.

d. The CGM shall be assembled in a plastic housing with protection class IP20 (IEC529) and flammability rated to UL94-5VB.

e. The CGM shall include an integral real-time clock and support time-based tasks which enables these field controllers to monitor and control schedules, calendars, alarms, and trends.

f. The CGM can continue time-based monitoring when offline for extended periods of time from a network.

g. The CGM can operate as a stand-alone controller in applications that do not require a networked supervisory device or for network applications where it is preferred to have the scheduling, alarming, and/or trending performed locally in the equipment controllers.

h. The CGM shall include troubleshooting LEDs to indicate the following conditions normal or abnormal operation of power, controller fault, SA bus communications, FC Bus communications, and end of line on/off.

i. The CGM shall have the ability to transfer and apply firmware files to all SA Bus devices (XPM, IOM, and networked zone sensors) connected to it.

j. The CGM shall include removable and labeled screw terminal blocks for all I/O, FC and SA Bus communication, and power wiring connections.

k. The CGM shall accommodate the direct wiring of analog and binary I/O field points with the following resolution.

   i. Inputs – 24-bit analog-to-digital converter

   ii. Outputs – +/- 200 mV accuracy in 0-10 VDC applications

l. The CGM shall support the following types of inputs and outputs supplied in the amounts required for the specified applications:

   i. Universal Inputs – 0-10 VDC analog input, 4-20 mA analog input, 0-600k ohms analog input, Dry contact binary input

   ii. Binary Inputs – Dry Contact Maintained Mode, Pulse Counter Mode

   iii. Analog Outputs – 0-10 VDC analog output, 4-20 mA analog output

   iv. Binary Outputs – 24 VAC Triac

   v. Configurable Outputs – 0-10 VDC analog output, 24 VAC Triac binary output

m. The CGM shall have the ability to monitor and control a network of sensors and actuators over a SA Bus.

n. The CGM shall include three (3) decimal rotary dial switches for setting the BACnet MS/TP device address.

~~n.~~ The CGM shall have the capability to execute complex control sequences involving direct wired I/O points as well as input and output devices communicating over a MS/TP Bus.

o. ~~Note: Item r. specifies a Local Controller Display. Remove from spec if not used on the project.~~

~~o.~~p. The CGM shall support a Local Controller Display as a remote device communicating over the SA Bus.

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i. The Display shall use a BACnet Standard SSPC-135 MS/TP protocol.

ii. The Display shall allow the user to view monitored points without logging into the system.

iii. The Display shall allow the user to view and change setpoints, modes of operation, and parameters.

iv. The Display shall provide password protection with user adjustable password timeout.

v. The Display shall be menu driven with separate paths for:

- Input/Output
- Parameter/Setpoint
- Overrides

vi. The Display shall use easy-to-read English text messages.

vii. The Display shall allow the user to select the points to be shown and in what order.

viii. The Display shall support a back lit LCD with adjustable contrast and brightens and automatic backlight brightening during user interaction.

ix. The Display shall have a keypad.

x. The Display shall be panel mountable.

~~p.~~g. Provide Johnson Controls CGM or approved equal

~~3.~~2. VAV Box Controller

a. The VAV Box Controller (hereafter referred to as CVM) shall provide both standalone and networked DDC of pressure-independent, VAV terminal units.

b. The CVM controller shall be a fully programmable, digital controller that communicates via BACnet MS/TP protocol over the FC Bus.

i. The CVM shall support BACnet Standard ANSI/ASHRAE 135.

- The CVM shall be BTL listed/certified.
- The CVM shall be tested and certified as a BACnet Advanced Application Controller (B-AAC).
- A BACnet Protocol Implementation Conformance Statement shall be provided for the CVM.

~~c. The CVM shall include 14 preloaded single duct VAV box control applications to allow the CVM to be made fully operational without the need to create a custom program.~~

~~d. The CVM shall employ finite state programming to eliminate unnecessary conflicts between control functions at crossover points in their operational sequences. Suppliers using non-state based DDC shall provide separate control strategy diagrams for all controlled functions in their submittals.~~

~~e. CVM controllers shall be factory programmed with a continuous adaptive tuning algorithm that senses changes in the physical environment and continually adjusts loop tuning parameters appropriately. Controllers that require manual tuning of loops or perform automatic tuning on command only shall not be acceptable.~~

~~f.~~c. The CVM shall be assembled in a plenum-rated plastic housing with protection class IP20 (IEC529) and flammability rated to UL94-5VB.

i. The CVM shall include an integral real-time clock and support time-based tasks which enables these equipment controllers to monitor and control schedules, calendars, alarms, and trends

~~g.~~d. The CVM can continue time-based monitoring when offline for extended periods of time from a network.

~~h~~e. The CVM shall include an integral differential pressure transducer and damper actuator. An additional configuration option shall be available that also includes an integral potentiometer for actual damper position feedback. All components shall be connected and mounted as a single assembly, removable as one piece.

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i.f. The integral damper actuator shall be a fast response stepper motor capable of stroking 90 degrees in 60 seconds for quick damper positioning to speed commissioning and troubleshooting tasks.

j.g. The CVM shall determine airflow by a state-of-the-art, digital, non-flow pressure sensor that supports automatic correction for polarity on high- and low-pressure DP tube connections to eliminate high- and low-pressure connection mistakes.

k.h. The CVM shall have the ability to automatically calibrate the flow sensor to eliminate pressure transducer offset error due to ambient temperature / humidity effects.

l.i. The CVM can operate as a stand-alone controller in applications that do not require a networked supervisory device or for network applications where it is preferred to have the scheduling, alarming, and/or trending performed locally in the equipment controllers.

m.j. The CVM shall include troubleshooting LEDs to indicate the following conditions normal or abnormal operation of power, controller fault, SA bus communications, FC Bus communications, and end of line on/off.

n.k. The CVM shall have the ability to transfer and apply firmware files to all SA Bus devices (XPM, IOM, and Networked zone sensors) connected to it.

o.l. The CVM shall include removable screw terminal blocks for all I/O, FC and SA Bus communication, and power wiring connections.

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p.m. The CVM shall accommodate the direct wiring of analog and binary I/O field points with the following resolution.

i. Inputs – 24-bit analog-to-digital converter

ii. Outputs – +/- 200 mV accuracy in 0-10 VDC applications

q.n. The CVM shall support the following types of inputs and outputs supplied in the amounts required for the specified applications:

iii. Universal Inputs – 0-10 VDC analog input, 4-20 mA analog input, 0-600k ohms analog input, Dry contact binary input

iv. Binary Inputs – Dry Contact Maintained Mode, Pulse Counter Mode

v. Analog Outputs – 0-10 VDC analog output, 4-20 mA analog output

vi. Binary Outputs – 24 VAC Triac

vii. Configurable Outputs – 0-10 VDC analog output, 24 VAC Triac binary output

r.o. The CVM shall have the ability to monitor and control a network of sensors and actuators over a SA Bus.

s.p. The CVM shall include three (3) decimal rotary dial switches for setting the BACnet MS/TP device address.

t.q. The CVM shall have the capability to execute VAV box control sequences involving direct wired I/O points as well as input and output devices communicating over the SA or FC buses.

u.r. The controller shall utilize a proportional plus integration (PI) algorithm for the space temperature control loops.

v.s. Each controller shall continuously, adaptively tune the control algorithms to improve control and controller reliability through reduced actuator duty cycle. In addition, this tuning reduces commissioning costs, and eliminates the maintenance costs of manually re-tuning loops to compensate for seasonal or other load changes.

w.t. The controller shall provide the ability to download and upload VAV box control application configuration files, both locally and via the FC Bus. Controllers shall be able to be loaded individually or as a group.

x.u. Control setpoint changes initiated over the network shall be written to CVM non-volatile memory.

y.v. The CVM controller firmware shall be flash-upgradeable remotely via the FC bus.

z.w. The CVM controller shall provide fail-soft operation if the airflow signal becomes unreliable, by automatically reverting to a pressure-dependent control mode.

~~aa.~~x. The CVM controller shall interface with balancer tools that allow automatic recalculation of box flow pickup gain ("K" factor), and the ability to directly command the airflow control loop to the box minimum and maximum airflow setpoints.

~~bb.~~y. The CVM controller shall have on-board diagnostics. These diagnostics shall consist of control loop performance measurements executing at each control loop's sample interval, which may be used to continuously monitor and document system performance. The CVM shall calculate Exponentially Weighted Moving Averages (EWMA) for each of the following metrics, which shall be available to the end user for efficient management of the VAV terminals.

~~cc.~~z. The controller shall detect system error conditions to assist in managing the VAV zones.

~~dd.~~aa. The controller shall provide a flow test function to view damper position vs. flow in a graphical format. The information would alert the user to check damper position. The CVM would also provide a method to calculate actuator duty cycle as an indicator of damper actuator runtime.

~~ee.~~bb. The CVM controller shall provide a compliant interface for ASHRAE Standard 62-1989 (indoor air quality), and shall be capable of resetting the box minimum airflow based on the percent of outdoor air in the primary air stream.

~~ff.~~cc. The CVM controller shall comply with ASHRAE Standard 90.1 (energy efficiency) by preventing simultaneous heating and cooling, and where the control strategy requires reset of airflow while in reheat, by modulating the box reheat device fully open prior to increasing the airflow in the heating sequence.

~~ff. Provide Johnson Controls CVM or approved equal~~

~~5. XPM expansion I/O module (XPM)~~

~~. The XPM provides additional input and output interfaces for use in digital controllers.~~

~~. The XPM shall communicate with controllers over the FC Bus or the SA Bus.~~

~~. The XPM shall support BACnet Standard ANSI/ASHRAE 135.~~

~~. The XPM shall be BTL listed/certified and carry the BTL Label.~~

~~. The XPM shall be tested and certified as a BACnet Smart Actuator (B-SA).~~

~~. A BACnet Protocol Implementation Conformance Statement shall be provided for the XPM.~~

~~. The XPM shall include removable screw terminal blocks for all I/O, SA/FC bus communication, and power wiring connections.~~

~~. The XPM shall include three (3) decimal rotary dial switches for setting the BACnet MS/TP device address.~~

~~. The XPM shall accommodate the direct wiring of analog and binary I/O field points with the following resolution:~~

~~. Inputs – 24-bit analog-to-digital converter~~

~~. Outputs – +/- 200 mV accuracy in 0-10 VDC applications~~

~~. The XPM shall support the following types of inputs and outputs:~~

~~vii. Universal Inputs – 0-10 VDC analog input, 4-20 mA analog input, 0-600k ohms analog input, Dry contact binary input~~

~~vii. Binary Inputs – Dry Contact Maintained Mode, Pulse Counter Mode~~

~~vii. Analog Outputs – 0-10 VDC analog output, 4-20 mA analog output~~

~~vii. Binary Outputs – 24 VAC Triac~~

~~vii. Configurable Outputs – 0-10 VDC analog output, 24 VAC Triac binary output~~

~~ff. The XPM shall include troubleshooting LEDs to indicate the following conditions normal or abnormal operation of power, controller fault, SA bus communications, FC Bus communications, and end of line on/off.~~

~~. Provide Johnson Controls XPM or approved equal as shown on plans.~~

~~25. Network Thermostat – Fan Coil and Zoning~~ ~~EDIT THIS SECTION OUT IF TECs ARE NOT USED~~

. The network thermostat shall be capable of controlling two- or four-pipe fan coils, cabinet unit heaters, a pressure dependent VAV System, zoning type systems employing reheat including local hydronic reheat valves, RTU/heat pump with economizer or other similar equipment.

. The Networked Thermostat shall communicate over the FC Bus using BACnet Standard protocol SSPC-135 or Johnson Controls N2 protocol.

vii. Communications shall be selectable locally at thermostat through the display.

. The TEC shall be BTL listed/certified and carry the BTL Label.

vii. The TEC shall be tested and certified as a BACnet Application Specific Controller (B-ASC).

. The network thermostat shall include a 4.2 inch LED backlit touch screen

. The network thermostat shall provide the flexibility to support any one of the following inputs:

vii. Integral indoor air temperature sensor.

vii. Analog input for remote air temperature sensing

vii. Universal input

vii. Remote indoor air temperature sensor.

vii. Two configurable binary inputs

. The network thermostat shall provide 4 digit passcode security.

. The network thermostat shall employ nonvolatile EEPROM for all adjustable parameters.

. The network thermostat shall have a temperature accuracy of ±0.9°F/±0.5°C at 70.0°F/21.0°C typical calibrated.

. The network thermostat shall have a humidity accuracy of ±5% RH from 20 to 80% RH at 50 to 90°F (10 to 32°C.)

. The network thermostat shall provide user equipment visibility from a mobile device

. Provide Johnson Controls TEC or approved equal as indicated on plans.

44.3. Network Sensors

a. The Network Sensors (NS) shall have the ability to monitor the following variables all within a single wall-mounted enclosure (no exceptions) as required by the systems sequence of operations:
    i. Zone Temperature
    ii. Zone Humidity
    iii. Zone Occupancy
    iv. Zone CO_2
b. The NS shall transmit the information back to the controller on the SA Bus using BACnet Standard protocol SSPC-135.
c. The NS shall be BTL listed/certified and carry the BTL Label.
    i. The NS shall be tested and certified as a BACnet Smart Sensors (B-SS).
d. The Network Zone Temperature Sensors shall include the following items: EDIT THIS SECTION TO INDICATE REQUIREMENTS FOR LOCAL DISPLAYS OR PLAIN COVER
    i. A backlit LCD to indicate the temperature, humidity and setpoint
    ii. An LED to indicate the status of the Override feature
    iii. A button to toggle the temperature display between Fahrenheit and Celsius
    iv. A button to program the display for temperature or humidity
    v. A button to initiate a timed override command
    vi. Available in either surface mount, wall mount, or flush mount
    vii. Available with either screw terminals or phone jack

e. Provide Johnson Controls NS series or approved equal where indicated on plans.

2.6 System Tools

1. One software copy of each system tool shall be provided with the BMS
2. System Configuration Tool
   a. The Configuration Tool shall be a software package enabling a computer platform to be used as a stand-alone engineering configuration tool for a Network Engine.
   b. The configuration tool shall provide an archive database for the configuration and application data.
   c. The configuration tool shall provide a site discovery feature to automatically discover field devices on connected buses and networks. Automatic discovery shall be available for the following field devices:
      i. BACnet Devices
      i. LonWorks devices
      ii. Johnson Controls N2 Bus devices
   d. A wireless access point shall allow a wireless enabled portable PC to make a temporary Ethernet connection to the automation network.
   e. Provide Johnson Controls SCT or approved equal.
3. Controller Configuration Tool
   a. As part of the single software tool environment including system and controller elements, the Controller Configuration Tool (CCT) shall be used to configure, simulate and commission equipment controllers and Network Control Engine controllers.
   b. The CCT shall operate in distinct modes to facilitate efficiency at various steps in the steps leading to project completion as well as future upgrades and maintenance
   c. The configuration tool shall be capable of programming the Equipment Controllers.
      i. The configuration tool shall provide the capability to configure, simulate, and commission the Equipment Controllers.
      ii. The configuration tool shall allow the equipment controllers to be run in Simulation Mode to verify the applications.
      iii. The configuration tool shall contain a library of standard applications to be used for configuration.
   d. The CCT shall provide multiple options for downloading files to the controllers including direct wired, wireless and Ethernet pass thru as dictated by controller type and location.

~~d. Provide Johnson Controls CCT or approve equal.~~

~~Note: Delete item 4 below if project is a new construction project or non-Metasys BMS takeover~~

~~3. Performance Verification Tool (PVT) Report or "AS-IS" Digital Time Capsule Report~~

~~. The IAS Contractor shall provide a "time capsule" report of all "as is" existing software and hardware configurations, as well as hardware operating status, for comparison with the final "as built" system, and/or to return the system to the "As Is" status and conditions in the event of a catastrophic failure.~~

~~. The AS-IS Digital Time Capsule Report shall include:~~

~~. A complete and current Integrated Automation System site inventory including the following information at a minimum: a listing of all field and supervisory controllers with the following key attribute data; corresponding model numbers, firmware versions, available security updates, CPU and memory performance data, battery conditions, integrations, controlled equipment, and device and point counts.~~

~~. A complete, documented evaluation of system configuration and performance in the following categories: Security, Energy Performance and Savings, Reliability, Comfort and Health, and Standards.~~

- The Security evaluation shall include information about controllers that require security updates and conformance of user accounts to latest security rules and best practices.
- The Energy Performance and Savings evaluation shall identify opportunities through schedule and nightly setbacks, economizers, eliminating simultaneous heating and cooling, and adding variable speed drives to equipment.
- The Comfort and Health evaluation shall identify temperature, pressure, and carbon dioxide values that deviate from desired set points that could lead to occupant discomfort.
- The Reliability evaluation shall identify overridden control points, control points creating excessive alarms, and opportunities to adding control points and trends to further enable system functionality.
- The Standards evaluation shall identify conformance to published IAS manufacturer controller limits for point count, network performance and protocol standards.

. The AS-IS Digital Time Capsule Report shall be submitted in writing, with a PDF copy on a portable thumb drive device.

2.I Computing Hardware and Software

1. General
   a. Computing hardware, software and operating systems shall be provided at the revision level or model number as specified or at the latest release of the vendor if not specified.
   b. In order to provide a consistent level of performance, all PCs shall be provided with Operating Systems and Processors by the manufacturer specified.
2. Dedicated Web Based User Interface
   a. PC Hardware – The personal computer(s) shall be configured as follows:
      i. Memory – 16 GB (8 GB Minimum)
      ii. CPU– Intel Quad Core processor. 3.2 GHz Clock Speed (minimum)
      iii. Hard Drive – 500 GB hard drive capacity
      iv. Hard drive backup system – CD/RW, DVD/RW or network backup software provided by owners IT department.
      v. Ports – (2) USB 3.0, Ethernet, VGA, microphone/headset
      vi. Keyboard – 101 Keyboard and 2 Button Mouse
      vii. Display configuration – 1-2 displays as follows:
         - Each Display – 24” LED Flat Panel Monitor 1920 x 1080 resolution minimum
         - 16 bit or higher color resolution
         - Display card with multiple monitor support
   b. Operating System Software
      i. Windows 10 Professional or Enterprise Edition with Anniversary Update (64 bit)
      ii. Provide complete operator workstation software package, including any hardware or software keys. Include the original installation disks and licenses for all included software, device drivers, and peripherals.
      iii. Provide software registration cards to the Owner for all included software.
   c. Peripheral Hardware
      i. Reports printer (Dedicated):
      ii. Printer Make – Hewlett Packard DeskJet
      iii. Print Speed – 600 DPI Black, 300 DPI Color
      iv. Buffer – 64 K Input Print Buffer (minimum)

~~10. Application and Data Server~~

~~. PC Hardware – The personal computer shall be configured as follows:~~

~~xii. Memory – 8 GB~~

~~xiii. CPU – Intel Dual Core processor. 2.8 GHz Clock Speed (minimum)~~

~~xiv. Hard Drive – 240 GB free hard drive space after program installation~~

~~xv. Hard Drive Backup – DVD/RW or 500 GB portable back-up drive~~

~~xvi. Ports: (2) USB 3.0, VGA, HDMI 1920x1080 resolution, Ethernet – 10/100/1000~~

~~xvii. User Interface:~~

- ~~101 key full size QWERTY Keyboard with number pad~~
- ~~Two (2) Button LED mouse~~
- ~~LED flat panel 24 in. monitor with wide screen full HD resolution~~

~~u. Software/Operating System Requirements~~

~~xxii. Windows 10 Pro or Windows 10 Enterprise Editions with Anniversary Update (version 1607) (64-bit)~~

~~xxiii. SQL 2014 Express SP3 (64-bit)~~

~~xxiv. Microsoft Office Professional~~

~~xxv. BMS supplier-specific programs and files required for described functionality.~~

~~26. Extended Application and Data Server~~

~~aa. PC Hardware – The personal computer(s) shall be configured as follows:~~

~~xxviii. Memory – 16 GB (8 GB Minimum)~~

~~xxix. CPU – Intel Quad Core processor. 3.2 GHz Clock Speed (minimum)~~

~~xxx. Optical Media Drive – DVD-RW 16x~~

~~xxxi. Hard Drives – 2x 500GB configured as Raid 1 (mirroring) with write caching turned on~~

~~xxxii. Hard Drive Backup – 1TB portable back-up drive or secure network backup provided by owner's IT department~~

~~xxxiii. Ports: (2) USB 3.0, HDMI capable of Wide screen 1920x1080 resolution, Ethernet 10/100/1000~~

~~xxxiv. User Interface:~~

- ~~101 key full size QWERTY Keyboard with number pad~~
- ~~Two (2) Button LED mouse~~
- ~~LED flat panel 24 in. monitor with wide screen full HD resolution~~

~~ll. Software/Operating System Requirements~~

~~xxxix. Windows Server 2012 (64-bit)~~

~~xl. SQL 2014 SP2 (64-bit)~~

~~xli. Microsoft Office Professional~~

~~xlii. BMS supplier-specific programs and files required for described functionality~~

~~2.QQ~~2.J Miscellaneous Devices

1. Local Control Panels
   a. All control panels shall be factory constructed, incorporating the BMS manufacturer's standard designs and layouts. All control panels shall be UL inspected and listed as an assembly and carry a UL 508A label listing compliance. Control panels shall be fully enclosed, with sub-panel, hinged door, and flush latch.

b. In general, the control panels shall consist of the DDC controller(s), display module as specified and indicated on the plans, and I/O devices—such as relays, transducers, and so forth—that are not required to be located external to the control panel due to function. Where specified the display module shall be flush mounted in the panel face unless otherwise noted.

c. All I/O connections on the DDC controller shall be provide via removable or fixed screw terminals.

d. Low and line voltage wiring shall be segregated. All provided terminal strips and wiring shall be UL listed, 300-volt service and provide adequate clearance for field wiring.

e. All wiring shall be neatly installed in plastic trays or tie-wrapped.

f. Control panels for use in seismic areas shall be built in an approved facility and carry the appropriate label.

g. Except where otherwise noted, all standard and custom control panels shall be built in an ISO9002 certified facility.

2. Power Supplies

a. DC power supplies shall be sized for the connected device load. Total rated load shall not exceed 75% of the rated capacity of the power supply.

b. Input: 120 VAC +10%, 60Hz

c. Output: 24 VDC

d. Line Regulation: +0.05% for 10% line change

e. Load Regulation: +0.05% for 50% load change

f. Ripple and Noise: 1 mV rms, 5 mV peak to peak

g. An appropriately sized fuse and fuse block shall be provided and located next to the power supply.

h. A power disconnect switch and convenience 120VAC outlet shall be provided next to the power supply.

Part 3 – Performance/Execution

3.A BMS Specific Requirements

1. Graphic Displays

a. Provide a color graphic floorplan of each floor of the building that is served by the BAS. Floorplans shall be 2D and shall have graphical layers for integrated systems device locations and data (as applicable) such as fire alarm, lighting controls, security, etc.

b. Provide a color graphic system flow diagram display for each system with all points as indicated on the point list. All terminal unit graphic displays shall be from a standard design library.

c. User shall access the various system schematics via a graphical penetration scheme and/or menu selection via the spaces navigation tree.

2. Custom Reports:

a. Provide custom reports as required for this project.

3.B Installation Practices

1. BMS Wiring

a. All conduit, wiring, accessories and wiring connections required for the installation of the BMS, as herein specified, shall be provided by the BMS Contractor unless specifically shown on the Electrical Drawings under Division 24 Electrical. All wiring shall comply with the requirements of applicable portions of Division 24 and all local and national electric codes, unless specified otherwise in this section.

b. All BMS wiring materials and installation methods shall comply with BMS manufacturer recommendations.

c. The sizing, type and provision of cable, conduit, cable trays, and raceways shall be the design responsibility of the BMS Contractor.

d. Class 2 Wiring

i. All Class 2 (24 VAC or less) wiring shall be installed in conduit unless otherwise specified.

ii. Conduit is not required for Class 2 wiring in concealed accessible locations. Class 2 wiring not installed in conduit shall be supported every 5' from the building structure utilizing metal hangers designed for this application. Wiring shall be installed parallel to the building structural lines. All wiring shall be installed in accordance with local code requirements.

e. Class 2 signal wiring and 24 VAC power can be run in the same conduit. Power wiring 120VAC and greater cannot share the same conduit with Class 2 signal wiring.

f. Provide for complete grounding of all applicable signal and communications cables, panels and equipment so as to ensure system integrity of operation. Ground cabling and conduit at the panel terminations. Avoid grounding loops.

2. BMS Line Voltage Power Source

a. 120-volt AC power for the BMS shall be provided by Division 26.

3. BMS Raceway

a. All wiring shall be installed in conduit or raceway except as noted elsewhere in this specification. Minimum control wiring conduit size 3/4".

b. Where it is not possible to conceal raceways in finished locations, surface raceway (Wiremold) may be used as approved by the Architect.

c. All conduits and raceways shall be installed level, plumb, at right angles to the building lines and shall follow the contours of the surface to which they are attached.

d. Flexible Metal Conduit shall be used for vibration isolation and shall be limited to 3 feet in length when terminating to vibrating equipment. Flexible Metal Conduit may be used within partition walls. Flexible Metal Conduit shall be UL listed.

~~Note: Sections 4, 5 and 6 are based on common practice in the area and must be edited for each project and area~~

~~5.~~4. Penetrations

a. Provide fire stopping for all penetrations used by dedicated BMS conduits and raceways.

b. All openings in fire proofed or fire stopped components shall be closed by using approved fire resistive sealant.

c. All wiring passing through penetrations, including walls shall be in conduit or enclosed raceway.

d. Penetrations of floor slabs shall be by core drilling. All penetrations shall be plumb, true, and square.

~~6.~~5. BMS Identification Standards

a. Node Identification. All nodes shall be identified by a permanent label fastened to the enclosure. Labels shall be suitable for the node location.

b. Cable types specified in Item A shall be color coded for easy identification and troubleshooting.

~~7.~~6. BMS Panel Installation

a. The BMS panels and cabinets shall be located as indicated at an elevation of not less than 2 feet from the bottom edge of the panel to the finished floor. Each cabinet shall be anchored per the manufacturer's recommendations.

b. The BMS contractor shall be responsible for coordinating panel locations with other trades.

~~8.~~7. Input Devices

a. All Input devices shall be installed per the manufacturer recommendation.

b. Locate components of the BMS in accessible local control panels wherever possible.

~~9.~~8. HVAC Input Devices – General

a. All Input devices shall be installed per the manufacturer recommendation.
b. Locate components of the BMS in accessible local control panels wherever possible.
c. The mechanical contractor shall install all in-line devices such as temperature wells, pressure taps, airflow stations, etc.
d. Input Flow Measuring Devices shall be installed in strict compliance with ASME guidelines affecting non-standard approach conditions.
e. Outside Air Sensors
    i. Sensors shall be mounted on the North wall to minimize solar radiant heat impact or located in a continuous intake flow adequate to monitor outdoor air conditions accurately.
    ii. Sensors shall be installed with a rain proof cover.
f. Water Differential Pressure Sensors
    i. Differential pressure transmitters used for flow measurement shall be sized to the flow-sensing device.
    ii. Differential pressure transmitters shall be supplied with tee fittings and shut-off valves in the high and low sensing pick-up lines.
    iii. The transmitters shall be installed in an accessible location wherever possible.
g. Medium to High Differential Water Pressure Applications (Over 21” WC)
    i. Air bleed units, bypass valves and compression fittings shall be provided.
h. Building Differential Air Pressure Applications (-0.5” to +0.5” WC)
    i. Transmitters exterior sensing tip shall be installed with a shielded static air probe to reduce pressure fluctuations caused by wind.
    ii. The interior tip shall be inconspicuous and located as shown on the drawings.
i. Air Flow Measuring Stations
    i. Where the stations are installed in insulated ducts, the airflow passage of the station shall be the same size as the inside airflow dimension of the duct.
    ii. Station flanges shall be two inch to three inch to facilitate matching connecting ductwork.
j. Duct Temperature Sensors
    i. Duct mount sensors shall mount in an electrical box through a hole in the duct and be positioned so as to be easily accessible for repair or replacement.
    ii. The sensors shall be insertion type and constructed as a complete assembly including lock nut and mounting plate.
    iii. For ductwork greater in any dimension than 48 inches or where air temperature stratification exists such as a mixed air plenum, utilize an averaging sensor.
    iv. The sensor shall be mounted to suitable supports using factory approved element holders.
k. Space Sensors
    i. Shall be mounted per ADA requirements.
    ii. Provide lockable tamper-proof covers in public areas and/or where indicated on the plans.
l. Low Temperature Limit Switches
    i. Install on the discharge side of the first water or steam coil in the air stream.
    ii. Mount element horizontally across duct in a serpentine pattern ensuring each square foot of coil is protected by 1 foot of sensor.
    iii. For large duct areas where the sensing element does not provide full coverage of the air stream, provide additional switches as required to provide full protection of the air stream.
m. Air Differential Pressure Status Switches
    i. Install with static pressure tips, tubing, fittings, and air filter.

n. Water Differential Pressure Status Switches

i. Install with shut off valves for isolation.

o. HVAC Output Devices

i. All output devices shall be installed per the manufacturers' recommendation. The mechanical contractor shall install all in-line devices such as control valves, dampers, airflow stations, pressure wells, etc.

ii. Control Dampers: Shall be opposed blade for modulating control of airflow. Parallel blade dampers shall be installed for two position applications.

iii. Control Valves: Shall be sized for proper flow control with equal percentage valve plugs. The maximum pressure drop for water applications shall be 5 PSI. The maximum pressure drop for steam applications shall be 7 PSI.

iv. Electronic Signal Isolation Transducers: Whenever an analog output signal from the BMS is to be connected to an external control system as an input (such as a chiller control panel), or is to receive as an input a signal from a remote system, provide a signal isolation transducer. Signal isolation transducer shall provide ground plane isolation between systems. Signals shall provide optical isolation between systems.

3.C Training

~~Note: Modify this section based on project size and owner profile~~

~~2.~~1. The BMS contractor shall provide the following training services:

a. Three days (24 hours) of on-site orientation by a system technician who is fully knowledgeable of the specific installation details of the project. This orientation shall, at a minimum, consist of a review of the project as-built drawings, the BMS software layout and naming conventions, a ~~walk through~~walkthrough of the facility to identify panel and device locations, and an abbreviated version of Factory Operator's training. Submit training agenda to the engineer for approval as part of the submittal process.

3.D Commissioning Requirements

1. Fully commission all aspects of the BMS work.

2. Provide Connected Workflow Dashboard for duration of the project construction.

3. Construction Installation and Commissioning Reports from Connected Workflow Dashboard.

a. Must be provided (Weekly, Monthly, Quarterly).

b. Updated automatically each work day.

c. Provide at any time by request of the construction chain for review.

d. Provides continuous system level punch lists for the entire project.

e. Integrated notes list functional system changes and reporting.

f. Aggregated reporting for percentage level completion of the project during installation.

~~1.~~

~~2.~~4. Acceptance Check Sheet

~~Note: Edit or delete items a., b., and c. according to specific project requirements~~

~~b.~~a. Prepare a check sheet that includes all points for all functions of the BMS as indicated on the point list included in this specification.

~~c.~~b. Submit the check sheet to the Engineer for approval.

~~d.~~c. The Engineer will use the check sheet as the basis for acceptance with the BMS Contractor.

~~3.~~5. VAV box performance verification and documentation:

a. The BMS Contractor shall test each VAV box for operation and correct flow. At each step, after a settling time, box air flows and damper positions will be sampled. Following the tests, a pass/fail report indicating results shall be produced. Possible results are Pass, No change in flow between full

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open and full close, reverse operation or Maximum flow not achieved. The report shall be submitted as documentation of the installation.

b. The BMS Contractor shall issue a report based on a sampling of the VAV calculated loop performance metrics. The report shall indicate performance criteria, include the count of conforming and non-conforming boxes, list the non-conforming boxes along with their performance data, and shall also include graphical representations of performance.

c. Promptly rectify all listed deficiencies and submit a document summarizing completion to the Engineer.

3.E ~~Performance Verification~~Connected Workflow Dashboard

1. Connected Workflow Dashboard for Commissioning:

a. The BAS contractor shall use a remote access portal gateway and an associated connected workflow dashboard browser extension to commissioning the field instrumentation and controls devices.

b. The data shall be automatically collected and pushed to a project specific 'cloud' instance where the commissioning status of the project can be accessed from a remote browser instance by a BAS Installation user.

c. The project specific 'cloud' instance shall summarize the status of the project commissioning activities and allow the user to pull down commissioning reports which can be shared with 3rd party agents through the contracting chain of command."

d. Provides rolling system level punch lists for the entire project.

e. Integrated notes list functional system changes and reporting.

f. Aggregated reporting for percentage level completion of the project during installation.

g. Security

i. Active Directory B2C authentication limiting authorization to registered employees with valid credentials.

ii. Supports the OAuth 2.0 and OpenID Connect protocols, which provide secure access to resources.

iii. Access data securely while performing authentication and authorization.

h. Disaster Recovery

i. Automatically store cloud hosted backups of last 7 days.

ii. Able to restore complete data during failure event.

~~Performance Verification~~

~~Note: Edit or delete items according to specific project requirements~~

~~3. The BMS Contractor shall perform a complete Performance Verification (PV) of the Building management system three times throughout the project:~~

~~c. At project turnover to customer.~~

~~c. At six (6) months of project operation.~~

~~c. At twelve (12) months of project operation or end of warranty.~~

~~3. Performance Verification shall include a complete and current Building Automation System site inventory including the following information at a minimum: a listing of all field and supervisory controllers with the following key attribute data; corresponding model numbers, firmware versions, available security updates, CPU and memory performance data, battery conditions, integrations, controlled equipment, and device and point counts.~~

~~3. Performance Verification shall include a complete written evaluation of system configuration and performance in the following categories:~~

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d. Security – The Security evaluation shall include information about controllers that require security updates and conformance of user accounts to latest security rules and best practices.

Energy Performance – The Energy Performance and Savings evaluation shall identify opportunities through schedule and nightly setbacks, economizers, eliminating simultaneous heating and cooling and adding VSD to equipment.

e. Comfort and Health – The Comfort and Health evaluation shall identify temperature, pressure, and carbon dioxide values that deviate from desired set points that could lead to occupant discomfort.

e. Reliability – The Reliability evaluation shall identify overridden control points, control points creating excessive alarms, and opportunities to adding control points and trends to further enable system functionality.

e. Standards – The Standards evaluation shall identify conformance to published standards for point count, network performance and protocol standards.

3. Provide all reports as specified on a new, USB compatible flash drive.

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23 09 93 Sequence of Operation for HVAC Controls

Part 1 – Sequence of Operation

1.A Sequence of Operation

Note: Insert applicable sequences here.

Part 2 – Points list

2.A Point Lists

Note: Insert applicable points lists here.

SECTION 230500 - BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 BASIC MECHANICAL METHODS

A. Variable Air Volume (VAV) with Hydronic Reheat

1. Interior air handling units are preferred.

2. Rooftop air handling units can be considered.

3. Adequate coil pull space shall be accounted for in all situations.

4. Air handling units will deliver cooled and dehumidified supply air to individual zones controlled by VAV boxes and reheat coils. Return air and outside air are mixed, heated or cooled, and filtered at the air handling unit. The cooling coil will be served by campus chilled water. Variable frequency drives (VFDs) provided with the air handling unit will allow energy savings at off-peak conditions. An economizer section of the air handling unit will allow up to 100% outside air for “free cooling” when weather conditions allow.

5. Exterior VAV boxes will include fans that can circulate room air through the heating coil without returning to the central air handler, thus avoiding operating the central air handler during unoccupied hours for required space heating.

B. Variable Air Volume (VAV) with Dedicated Outside Air System

1. Interior air handling units are preferred.

2. Rooftop air handling units can be considered.

3. Adequate coil pull space shall be accounted for in all situations.

4. Central station air handling units will deliver cooled and dehumidified supply air to individual zones controlled by VAV boxes and reheat coils. Return air and outside air are mixed, heated or cooled, and filtered at the air handling unit. The cooling coil will be served by Campus chilled water. Variable frequency drives (VFDs) provided with the air handling unit will allow energy savings at off-peak conditions. An economizer section of the air handling unit will allow up to 100% outside air for “free cooling” when weather conditions allow. A carbon dioxide sensor located at the return air inlet on the AHU will allow outside airflow rates to be reduced to conserve energy.

5. A separate energy recovery system will deliver dehumidified and partially conditioned air to individual zones controlled by VAV boxes and occupancy

sensors. The preferred location of the energy recovery unit is interior to the building. The energy recovery unit saves energy and may allow reduction in total cooling capacity to offset its first cost.

C. Fan Coil Unit (FCU) with Dedicated Outside Air System (Only if approved by the University)

1. Four-pipe fan coil units will be located above ceilings to provide heat and cooling. Each fan coil unit has a filter, fan, and coils that are connected to hydronic piping. Fan coil units require frequent access to replace filters. They will be located away from occupied spaces and/or have some lined ductwork to minimize noise transfer.

2. Hydronic piping serves the fan coil units and provides water for the heating and cooling coils. The heating water will be supplied from a central boiler system within the building and the chilled water will be supplied from the campus utility.

3. A separate energy recovery system will deliver dehumidified and partially conditioned air to individual fan coil units. The preferred location of the energy recovery unit is interior to the building. Occupancy open and close ventilation VAV boxes will provide only the amount of ventilation needed. The cooling coil in the energy recovery unit will be served by chilled water from the campus utility. The heating coil in the energy recovery unit will be served from a central boiler system within the building. The heating coil will need to be designed for when the enthalpy wheel in the unit may go into defrost operation and not provide any heat recovery. Variable frequency drives (VFDs) provided with the supply and exhaust fan will allow for reduced airflows at off-peak conditions. The energy recovery unit saves energy and may allow reduction in total cooling capacity to offset its first cost.

D. Hydronic Systems

1. Chilled Water for buildings on campus is provided through a campus loop served from one main plant operations building.

a. Buildings shall have tertiary pumps from the loop system. These pumps shall have a controlled bypass to allow the loop pressure to maintain flow through the building until the pressure provided is not great enough, then the bypass shall close and the tertiary pumps shall operate.

b. Two pumps shall be provided, each at 100% capacity (N+1).

2. Building heat shall be provided with localized boilers. When a new boiler system will be installed, individual boilers will be high efficiency condensing.

a. Boiler system shall be high efficiency condensing boilers with a system turndown greater than 10:1 turndown capability.

b. N+1 Redundancy shall be provided when possible.

c. Boilers shall be direct vent when possible.

d. Two pumps shall be provided, each at 100% capacity (N+1).

3. A hydronic heating system will provide hot water to VAV box heating coils and other terminal heating equipment. The boilers are sequenced and configured such that the water temperature can be reduced during mild outside air temperatures to conserve energy. Heating water pumps will be fitted with VFDs, which allow for further energy savings. To meet code-mandated ventilation flow rates without over-cooling rooms, boilers and pumps will operate in the summer.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 230500

SECTION 230553 - HVAC IDENTIFICATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Identification of products installed under Division 23.

B. Equipment naming convention.

C. Equipment labeling.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Nameplates: Black enamel background with natural aluminum border and engraved letters furnished with two mounting holes and screws.

B. Brass Tags: Brass background with engraved black letters. Tag size minimum 1-1/2" square or 1-1/2" round.

1. All valves (except shutoff valves at equipment) shall have numbered tags.

2. Provide or replace numbered tags on all existing valves that are connected to new systems or that have been revised.

3. Provide all existing valves used to extend utilities to this project with numbered tags. Review tag numbering sequence with the Owner prior to ordering tags.

4. Secure tags with heavy duty key chain and brass "S" link or with mechanically fastened plastic straps.

5. Attach to handwheel or around valve stem. On lever operated valves, drill the lever to attach tags.

6. Number all tags and show the service of the pipe.

7. Provide two sets of laminated 8-1/2" x 11" copies of a valve directory listing all valves, with respective tag numbers, uses, and locations. The directory shall be reviewed by the Owner and Architect/Engineer prior to laminating final copies. Laminated copies shall have brass eyelet in at least one corner for easy hanging.

C. Vinyl Pipe Markers: Colored vinyl with permanent pressure sensitive adhesive backing.

1. Adhesive Backed Markers: Use Brady Style 1, 2, or 3 on pipes 3" diameter and larger. Use Brady Style 4, 6, or 8 on pipes under 3" diameter. Similar styles by other listed manufacturers are acceptable. Secure all markers at both ends with a wrap of pressure sensitive tape completely around the pipe.

2. Apply markers and arrows in the following locations where clearly visible:

a. At each valve.

b. On both sides of walls that pipes penetrate.

c. At least every 20 feet along all pipes.

d. On each riser and each leg of each "T" joint.

e. At least once in every room and each story traversed.

D. Underground Pipe Markers: Bright colored continuously printed plastic ribbon tape 6"wide by 3.5 mils thick, manufactured for direct burial, with aluminum foil core for location by non-ferric metal detectors and bold lettering identifying buried item.

1. Underground Pipe Markers: Install 8" to 10" below grade, directly above buried pipes.

E. Tracer Wire:

1. Single copper conductors shall be solid or stranded annealed or hard uncoated copper per UL83 and ASTM requirements. Tracer tape or copper-coated steel wire is not acceptable.

2. Conductor shall be insulated with HMWPE as specified and applied in a concentric manner. The minimum at any point shall not be less than 90% of the specified average thickness in compliance with UL 83.

3. Tracer wire shall be continuously spark tested at 7500 Volts DC. Other electrical and mechanical tests shall be in accordance with UL 1581.

4. Tracer wire shall be installed on top of all non-metallic buried utilities.

5. Tracer wire shall be taped directly to plastic water or drain pipe.

6. Tracer wire shall not be fastened directly or indirectly to gas piping.

7. Tracer wire when attached shall be secured to the pipe a minimum of every 10 feet and at all changes of direction.

8. Tape shall be Polyken “930-35”, Protecto-Wrap “310”, or approved equal.

9. Tracer wire shall be continuous between boxes and shall be tested for continuity.

10. Splices in tracer wire shall be made with a water proof splice kit to prevent corrosion. **Wire nuts shall not be used.**

11. The tracer wire shall daylight to grade through a 2” PVC conduit, at the point of the utility entrance to building. PVC conduit shall be capped and

2.2 EQUIPMENT NAMING CONVENTION

A. All new equipment shall receive a designation consisting of a building number (four characters - contact Campus personnel for the building numbers, an equipment code (three characters), and then a floor level followed by the actual equipment number (four characters).

B. Equipment Code - the first three characters equipment type:

1.	Chilled Water Pump	CWP
2.	Heating Water Pump	HWP
3.	Air Handling Unit	AHU
4.	Dedicated Outside Air Unit	DOA
5.	Fan Coil Unit	FCU

EXAMPLE: **7006/NHD/2001** = DUNHAM HALL, AIR HANDLING UNIT, LOCATED ON THE SECOND FLOOR, THE FIRST AIR HANDLING UNIT ON THAT LEVEL.

EXAMPLE: **7018/FCU/B020** = FOUNDERS HALL, FAN COIL UNIT, LOCATED IN THE BASEMENT, THE TWENTIETH FAN COIL UNIT ON THAT LEVEL.

C. Equipment:

1. All equipment not easily identifiable such as controls, relays, gauges, etc.; and all equipment in an area remote from its function such as air handling units, exhaust fans, filters, reheat coils, dampers, etc.; shall have nameplates or plastic tags listing name, function, and drawing symbol. Do not label exposed equipment in public areas.

2. Fasten nameplates or plastic tags with stainless steel self-tapping screws or permanently bonding cement.

D. Miscellaneous:

1. Attach self-adhesive vinyl labels at all duct access doors used to reset fusible links or actuators on fire, fire/smoke, or smoke dampers. Lettering shall be a minimum of 1/2" high. Labels shall indicate damper type.

E. Tracer Wire:

1. Tracer wire shall be installed on top of all non-metallic buried utilities.

2. Tracer wire shall be taped directly to plastic water or drain pipe.

3. Tracer wire shall not be fastened directly or indirectly to gas piping.

4. Tracer wire when attached shall be secured to the pipe a minimum of every 10 feet and at all changes of direction.

5. Tape shall be Polyken “930-35”, Protecto-Wrap “310”, or approved equal.

6. Tracer wire shall be continuous between boxes and shall be tested for continuity.

7. Splices in tracer wire shall be made with a water proof splice kit to prevent corrosion. **Wire nuts shall not be used.**

8. The tracer wire shall daylight to grade through a 2” PVC conduit, at the point of the utility entrance to building. PVC conduit shall be capped and labeled as future contact point to locate the utility.

2.3 SCHEDULE

A. Pipes to be marked:

Pipe Service	Lettering Color	Background Color
High Temperature Hot Water - over 240ºF	Black	Yellow
High Pressure Steam	Black	Yellow
Low Pressure Steam	Black	Yellow
Heating Water Supply	Black	Yellow
Heating Water Return	Black	Yellow
High Pressure Condensate	Black	Yellow
Low Pressure Condensate	Black	Yellow
Pumped Condensate	Black	Yellow
Chilled Water Supply	White	Green
Chilled Water Return	White	Green
Condenser Water Supply	White	Green
Condenser Water Return	White	Green
Condensate Drain	Black	Yellow
Compressed Air	Black	Yellow

Pipe Service	Lettering Color	Background Color
Control Compressed Air	Black	Yellow
Natural Gas	Black	Yellow
All Underground Pipes	Varies	Varies
Medical Vacuum	Black	White
Waste Anesthetic Gas Disposal	White	Violet
Carbon Dioxide	White	Gray
Instrument Air	White	Red
Medical Air	Black	Yellow
Nitrogen	White	Black
Nitrous Oxide	White	Blue
Oxygen	White	Green
Refrigerant (Liquid, Suction or Hot Gas)	Black	Yellow
Fuel Oil Piping (Supply and Return)	Black	Yellow
Tracer Wire - Natural Gas Pipe Lines	---	Yellow
Tracer Wire - All other buried types	---	Green

END OF SECTION 230553

SECTION 23 07 13 - DUCTWORK INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Ductwork Insulation.

PART 2 - PRODUCTS

2.1 GENERAL

A. All insulation shall meet or exceed current AHSRAE 90.1 and International Energy Code requirements.

B. Provide insulation with vapor barrier when air conveyed may be below ambient temperature.

2.2 MATERIALS

A. Flexible fiberglass wrap insulation shall be utilized for all supply duct unless inside mechanical rooms, double wall ductwork, or when the use of liner insulation is approved.

B. Semi-rigid fiberglass board wrap shall be utilized for applications when duct is within mechanical spaces.

C. Flexible fiberglass liner shall be used for all return air transfer ducts and must be approved by the University for applications and only considered when acoustical properties are desired.

END OF SECTION 230713

SECTION 230719 - HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Piping Insulation.

B. Insulation Jackets.

PART 2 - PRODUCTS

2.1 INSULATION

A. All insulation shall meet or exceed current AHSRAE 90.1 and International Energy Code requirements. All insulation shall be plenum rated and insulation must meet 25/50.

B. General Installation Requirements:

1. Continue insulation with vapor barrier through penetrations. This applies to all insulated piping. Maintain fire rating of all penetrations.

2. On all insulated piping, provide at each support an insert of same thickness and contour as adjoining insulation, between the pipe and insulation jacket, to prevent insulation from sagging and crushing. The insert shall be suitable for planned temperatures, be suitable for use with specific pipe material, and shall be a 180° cylindrical segment the same length as metal shields. Inserts shall be a cellular glass (for all temperature ranges) or molded hydrous calcium silicate (for pipe with operating temperatures above 70°F, with a minimum compressive strength of 50 psi. Factory fabricated inserts may be used. Rectangular blocks, plugs, or wood material are not acceptable. Temporary wood blocking may be used by the Piping Contractor for proper height; however, these must be removed and replaced with proper inserts by the Insulation Contractor.

3. Install metal shields between all hangers or supports and the pipe insulation. Shields shall be galvanized sheet metal, half-round with flared edges. Adhere shields to insulation. On cold piping, seal the shields vapor-tight to the insulation as required to maintain the vapor barrier, or add separate vapor barrier jacket.

4. On 1" and smaller piping routed through metal wall studs, provide a plastic grommet to protect the piping. The piping shall be insulated between the wall studs, and the insulation shall butt up to each stud.

C. Insulated Piping Operating Below 60°F:

1. Insulate fittings, valves, unions, flanges, strainers, flexible connections, flexible hoses, and expansion joints. Seal all penetrations of vapor barrier.

2. On piping operating below 60ºF in locations that are not mechanically cooled (e.g., penthouses, mechanical rooms, tunnels, chases at exterior walls, etc.), Elastomeric insulation shall be used.

3. All balance valves with fluid operating below 60°F shall be insulated with a removable plug wrapped with vapor barrier tape to allow reading and adjusting of the valve.

D. Insulated Piping Operating Between 60°F and 140°F:

1. Do not insulate flanges and unions, but bevel and seal ends of insulation at such locations. Insulate all fittings, valves and strainers.

E. Insulated Piping Operating Above 140°F:

1. Insulate fittings, valves, flanges, and strainers.

2. All balance valves with fluid operating above 140°F shall be insulated and an opening shall be left in the insulation to allow for reading and adjusting the valve

F. In addition to other requirements, pipe insulation and jackets inside the main chilled water plant shall be colored to match existing color code scheme for each pipe system type.

2.2 JACKET COVERINGS

A. Aluminum Jackets: ASTM B209; 0.016" thick; stucco embossed finish with Z edge seams and aluminum bands for outdoor use.

B. Stainless Steel Jackets: Type 316 stainless steel; .010” thick; smooth finish with Z edge seams and stainless steel bands for outdoor use.

C. Plastic Jackets and Fitting Covers: High impact, glossy white, 0.020" thick for interior use and 0.030" thick for exterior use, self-extinguishing plastic. Suitable for use indoors or outdoors with ultraviolet inhibitors. 25/50 maximum flame spread/smoke developed.

D. Provide jacket cover an all exterior pips with insulation, including elastomeric insulation.

E. Provide jacket cover on all exposed piping below 8’-0” above floor.

F. Provide jacket cover on all piping in mechanical rooms subject to damage from normal operation

2.3 SCHEDULE

Piping System	Insulation Type/Thickness
A. Chilled Water Supply & Return	
All Sizes (located in air conditioned spaces)	Glass Fiber or Elastomeric
All Sizes (located in non-air conditioned spaces)	Elastomeric
All Sizes (located in modular chiller enclosure)	Elastomeric
All Sizes (located inside air handling unit airstream)	Elastomeric
B. Cooling Coil Condensate Drains below 55°F	Elastomeric
C. Heating Water Supply & Return	Glass Fiber
D. Condenser Water Supply & Return (Indoor)	Glass Fiber or Elastomeric
E. Refrigerant	Elastomeric

END OF SECTION 230719

SECTION 230900 - CONTROLS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Complete System of Automatic Controls.

B. Control Devices, Components, Wiring and Material.

C. Control Sequences.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Johnson Controls.

2.2 Every unit controller, building controller, network engine, etc., shall be BacNET MSMP capable.

2.3 TERMINAL AIR BOX (TAB) CONTROLLERS

A. FMCS Volume Controller: Electronic, furnished and installed by TCC. Boxes shall have pressure independent control to maintain constant air volume regardless of duct pressure changes up to 6 inches w.c. Provide velocity and static sensor at box inlet for use by unit controller. Set boxes for maximum and minimum settings shown on the drawings.

B. The controller shall support various digital and analog inputs and outputs as needed for damper control, control valves, electric coils, airflow sensors, remote heating, occupancy sensors, etc. and shall be capable of independent occupancy scheduling. Provide with discharge air temperature sensor.

C. Controller shall provide continuous zone temperature histories internal to device for up to 24 hours and perform its own limit and status monitoring and alarms to limit unnecessary communications.

D. Store all system setpoints, proportional bands, control algorithms, and other programmable parameters such that a power failure of any duration does not necessitate reprogramming of the controller.

E. BACnet TAB controllers shall either be B-AAC devices or B-ASC devices as required to meet the performance and BTL listing.

2.4 TEMPERATURE SENSORS

A. All sensors shall be BACnet MS/TP capable.

B. Public spaces such as corridors shall be sensors only.

C. Classrooms and office spaces shall have digital readouts with adjustments and override?

2.5 HYDRONIC CONTROL VALVES

A. General:

1. Two-position valves shall be a minimum of line size with a maximum allowable pressure drop of 2 psi.

2. Size two-way and three-way modulating valves to provide a pressure drop at full flow of 1 to 4 psi, except boiler three-way and cooling tower bypass valves shall not have a pressure drop over 2 psi.

3. Two-way valves shall be 100% tight-closing. Three-way valves shall be 100% tight-closing in both extreme positions.

4. Modulating two-way valves shall have equal percentage flow characteristics.

5. Modulating three-way valves shall have linear flow characteristics.

6. Piping geometry correction factors for C_v ratings shall be used and stated for ball valves, butterfly valves, or non-characterized valves.

B. Pressure Independent:

1. All chilled water control valves shall be pressure independent.

2. Shall meet all requirements of valve types listed above.

3. Shall be used for chilled water system control valves.

4. Valve shall accurately control flow from 0% to 100% full rated flow with an operating pressure differential range of 5 to 50 PSID across the valve.

5. Maintenance free design. No replacement cartridges or packing allowed.

2.6 ELECTRIC VALVE ACTUATORS

A. General:

1. Actuators shall be sized to operate the valve through its full range of motion and shall close against pump shutoff pressure without producing audible noise at any valve position.

2. Provide visual position indication.

3. Mount actuator directly on valve or provide linear motion assembly as required for valve type.

2.7 CONTROL INSTRUMENTATION

A. BTU Meters:

1. General:

a. The entire Energy Measurement System shall be built and calibrated by a single manufacturer, ONICON Incorporated, and shall consist of a flow meter, two temperature sensors, a BTU meter, temperature thermowells, and all required mechanical installation hardware. A certificate of NIST* traceable calibration shall be provided with each system. All equipment shall be covered by the manufacturer's two year warranty.

2. BTU Meter:

a. Provide an ONICON System-10 BTU Meter. The BTU meter shall provide the following points both at the integral LCD and as outputs to the building control system: Energy Total, Energy Rate, Flow Rate, Supply Temperature and Return Temperature. Output signals shall be either serial network (protocol conforming to BACnet® MS/TP, BACnet/IP, LONWORKS®, JCI-N2, MODBUS RTU RS485, MODBUS RTU TCP/IP, or Siemens-P1) and/or via individual analog and pulse outputs. Each BTU meter shall be factory programmed for its specific application, and shall be re-programmable using the front panel keypad (no special interface device or computer required).

3. Temperature Sensors:

a. Temperature sensors shall be loop-powered current based (mA) sensors and shall be bath-calibrated and matched (NIST* traceable) for the specific temperature range for each application. The calculated differential temperature used in the energy calculation shall be accurate to within +0.15°F (including the error from individual temperature sensors, sensor matching, input offsets, and calculations).

4. Flow Meter:

   a. Provide an ONICON Model F-3500 Insertion Electromagnetic Flow Meter. Materials of construction for wetted metal components shall be 316 SS. For installations in non-metallic pipe, install grounding rings or probes. The flow meter shall average velocity readings from two sets of diametrically opposed electrodes. Each flow meter shall be individually wet-calibrated against a primary volumetric standard that is accurate to within 0.1% and traceable to NIST*. A certificate of calibration shall be provided with each flow meter. Accuracy shall be within ± 1% of rate from 2-20 ft/s. Overall turndown shall exceed 100:1. Output signals shall be completely isolated and shall consist of the following: (1) high resolution frequency output for use with peripheral devices such as an ONICON display module or Btu meter, (1) analog output; 4-20mA, 0-10V, or 0-5V jumper selectable and (1) scalable dry contact output for totalization. Each flow meter shall be covered by the manufacturer's two-year warranty.

   b. Provide an ONICON F-3200 Series Electromagnetic Flow Meter complete with integral or remote electronics module. The electronics module shall include a backlit graphic display and keypad. Connections to the piping shall be ANSI class 150 flanges (ANSI class 300 available where required). The installing contractor is responsible for providing suitable mating flanges. The flow tube shall be epoxy coated steel; the sensing electrodes shall be 316SS; the liner shall be polypropylene or ebonite for low temperature service, PFTE for hot water service. Each flow meter shall be individually wet-calibrated and accurate to within ±0.2% of reading from 1.6 to33 feet per second velocity. A certificate of calibration shall be provided with each flow meter. Output signals shall be 4-20 mA and programmable pulse. The flow meter shall be capable of measuring bi-directional flow. For installations in non-metallic pipe, install grounding rings between flanges. Each flow meter shall be factory programmed for its specific application, and shall be re-programmable using the integral keypad on the converter (no special interface device or computer required).

   c. Provide manufacturer's recommended lengths of straight piping upstream and downstream of the flow meter. Up to 30 diameters upstream of the flow meter may be required depending on the piping arrangement and flow meter type.

5. Transmitter:

   a. Each meter shall incorporate an integral mounted programmable transmitter that incorporates a digital display.

   b. Each transmitter shall calculate and display flow rate and net totalized flow, along with associated engineering units (e.g., GPM and Gal.)

c. Each transmitter shall produce an analog output signal that is directly proportional to volumetric flow rate. This signal shall be scalable to indicate flow rate in either direction. In lieu of such bidirectional scalability, two separate pulsed outputs shall be provided. One shall indicate incremental flow in one direction, while the other indicates incremental flow in the opposite direction such that net totalized flow can be calculated remotely. Transmitters that produce an output signal indicating direction of flow in conjunction with a flow rate signal that is scalable in one direction only are not acceptable.

d. Unless scheduled or otherwise indicated, the initial span adjustment of each transmitter shall be 0-120% of the scheduled maximum flow rate.

e. Each transmitter shall incorporate self-diagnostics and test functions in order to permit internal checks of all outputs and displays and to verify the accuracy of the unit and the integrity of the current loop without any external equipment.

6. Accuracy:

a. Non-billing Purposes: Where meters are used for non-billing purposes, the accuracy of each meter/transmitter assembly shall be ± 0.5% of flow rate reading over a range of 3-15 ft/section fluid velocity, with a repeatability of 0.1%. Accuracy at 1 ft/section shall be ± 0.75%.

7. Calibration:

a. Each meter shall be calibrated on a NIST traceable flow stand at a minimum of three operating points. These three points shall be the flow rates associated with fluid velocities of 1.0 FPS, 8.0 FPS, and 15.0 FPS. Written documentation of calibration shall be provided.

8. Installation and Startup:

a. Each meter assembly shall include detailed installation and operation instructions that include piping straight run requirements.

b. Each bid shall include the cost of on-site startup, commissioning, and training.

9. Warranty:

a. Each meter assembly shall carry a performance warranty of at least two years from the date of installation and startup. This warranty shall cover parts and labor for repair or replacement of the meter assembly. Performance during the warranty period shall satisfy the above-stated requirements for accuracy and repeatability.

10. Approved Manufacturers: Onicon.

B. Water Meter (Meter Main Case):

1. Outer cases shall be made of one of the following materials:

a. 2” – 12”: Cast ductile iron alloy equaling or exceeding AWWA Standards such as those listed in ASTM A536 or ASTM A126. The maincase shall be protected by a complete fusion-bonded coating conforming to AWWA C-550.

2. All external bolts and nuts shall be made of bronze or stainless steel, and shall be so designed for easy removal after having been in service for a long period of time.

3. The main case shall withstand a working pressure of 175 PSI without leakage, seepage in the castings, or distortion affecting the free and accurate operation of the measuring unit.

4. The size of the meter and the direction of flow shall be case in raised letters on the outer surface of the case.

5. Register Cover:

a. The register box shall be made of an engineering plastic with the manufacturer’s serial number inside the register lid. Serial number of the meter shall also be permanently programmed in the electronic register.

b. Register cover box shall be attached to main case in a tamper resistant manner. The register cover box shall be equipped with a hinged lid that will overlap the register to protect the reading area.

6. Register:

a. The factory sealed register shall be electronically driven only and shall be furnished with a low flow leak detection symbol and with a reverse flow notification symbol. The register shall be identical within a given size or model subject to the programming of appropriate flow factors for the particular meter. An effectively tamper proof meter with a displayed tamper indication symbol, is required. The register shall be programmed initially to read in US. Gallons. The transparent LCD register glass lens shall be made of molded heat-treated 0.25” glass to ensure against scratching and breakage. Serial number shall be permanently programmed in the electronic register.

b. As defined in these specifications, a "factory sealed" register shall mean a non-fogging, moisture and dust-proof register, electronically driven by the measuring section transit time sensors. Appearance of any fogging or moisture inside the register within the

warranty period shall constitute component failure and will require a factory replacement. Register shall indicate reverse flow, rate of flow, low battery indication, leak alert, as well as no flow condition.

7. Measuring Section:

   a. The measuring section shall be a unitized unit, completely integral to the meter body. The measuring section shall not include any moving parts and the measuring section shall have an unobstructed flow passage area at least equal to 50% of the nominal Schedule 40 pipe size corresponding to the meter's size.

   b. All parts of the measuring section shall be similar with assemblies of the same size and material.

   c. The measuring section shall be secured in a position in the main case in such a manner that slight distortion of the outer meter case will not affect the sensitivity or registration of the meter.

   d. To ensure longevity of service, the performance of the measuring chamber shall be guaranteed to meet required Compound meter accuracy standards of AWWA M6 Manual for a period of two years from date of manufacturer's shipment.

   e. The measuring section shall be covered for this period by written warranty as required or mentioned elsewhere in these specifications.

8. Signal Processing:

   a. Two pairs of sensors are to be mounted in the chordal direct configuration in the measuring section to measure the actual transit time of the initiated and reception-generated ultrasonic sound pulses. Transit time measurements for a single pass of initiated and return pulses are to be accurate to within 300 pico-seconds for a loop time.

   b. Multiple measurements are sampled at a minimum of 1 second intervals of these transit time loops that are made to significantly improve accuracy over a single pass transit time measurements as employed in typical AWWA C750 ultrasonic meters to achieve low flow rate measuring accuracy.

   c. Ultrasonic meters using single directional sound transmission to determine flow measurements are not acceptable. Meters that use measurement principals based on Faraday's Law are not permitted.

      1) Signal Outputs: The meter shall have digital pulse output.

      2) The Digital (pulse) Output is to be an open collector (open drain) transistor output that provides pulse per quantity with these options:

a) Two scaled forward flow pulses.

b) One scaled pulse forward flow and one flow direction.

c) One scaled forward flow pulse and one scaled reverse flow pulse.

9. Installation Requirements:

a. Meters shall be designed so that no strainer or straightening vanes are required. There shall be no internal parts blocking the waterway. No straight runs of pipe shall be necessary before or after the meter.

10. Pressure Capability:

a. Meters shall operate up to a working pressure of one hundred seventy five pounds per square inch (PSI) and to a temperature of 122 degrees Fahrenheit, without leakage or damage to any parts. The accuracy shall not be affected when operating at this pressure to possible distortion.

11. Coordinate with the Plumbing Contractor for correct meter size.

12. Meter shall be provided by the Controls Contractor for installation by the Plumbing Contractor.

13. Acceptable Manufacturers: Master Meter Octave

C. Natural Gas Submeter:

1. Meter shall have integral electronics with indication and totalization.

2. Meter shall operate with maximum capacity of 1750 CFH.

3. Meter shall provide pulsed output interface.

4. Meter shall provide gas usage with imperial display.

5. Coordinate with the Plumbing Contractor for correct meter size.

6. Meter shall be provided by the Controls Contractor for installation by the Plumbing Contractor.

7. Manufacturer shall be Sensus Sonix 2000 or equal.

D. Electrical Submeter:

1. Coordinate with the Electrical Contractor to ensure submeter is compatible for TCS monitoring.

2. Provide electrical usage data to TCS as indicated on the drawings.

2.8 PNEUMATIC CONTROLS

A. Pneumatic controls shall not be utilized for new equipment,\

PART 3 - CONTROL SEQUENCES

3.1 REFERENCE POINTS

A. Outside Reference Points:

1. Outside Air Dry Bulb Reference Temperature: Install an outside air temperature sensor on the exterior of the building.

2. Outside Air Reference Humidity: Install an outside air humidity sensor on the exterior of the building. Location to be determined per manufacturer's recommendations and Architect/Engineer's approval. TCC shall prime and paint the device enclosure. Color selection by Architect.

3. Outside Air Reference Pressure: Install outside air pressure terminations on all four major sides of the building and pipe with equal lengths of 1/4" tubing to a 2" minimum pipe manifold. Piping by TCC. Locations to be determined per manufacturer's recommendations and Architect/Engineer's approval. TCC shall prime and paint the device enclosure. Color selection by Architect.

4. Outside Air Reference Carbon Dioxide: Install an outside air carbon dioxide sensor on the exterior of the building. Location to be determined per manufacturer's recommendations and Architect/Engineer's approval. TCC shall prime and paint the device enclosure. Color selection by Architect.

1.2 AIR SYSTEMS

A. Air Handling Unit Control

1. General:

a. The air handling unit is a variable air volume packaged unit.

b. The air handling unit is controlled by a direct digital controller (DDC).

c. The air handling unit is equipped with the following:

1) Supply fan with VFD.
2) Return fan with VFD.
3) Outside air damper furnished by AHU manufacturer.
4) Return air damper furnished by AHU manufacturer.
5) Relief air damper furnished by AHU manufacturer.
6) Hot water coil for heating with circulating pump.
7) Chilled water coil for cooling.

8) Electronic actuators with positive position indication furnished by TCC.

2. Supply Fan:

a. Start/Stop: The DDC system shall start the supply fan via the VFD with a time delay to allow all fire/smoke and smoke dampers in the air handling system to open prior to supply fan operation.

b. VFD Reset: The TCC shall wire from the fault detection output contacts in the VFD to the DDC system. In case of VFD fault detection, the DDC system shall wait 30 seconds (adj.) and then call the VFD to start. If the VFD does not start, the DDC system shall call a second time. If the VFD still has not started, an alarm shall be sent to the operator interface.

c. Current Status Switch: Install a current status switch to prove supply fan operation. Locate switch so it can sense fan status when operated by the VFD or in bypass mode. If the current status switch does not prove operation, the unit shall shut down and send an alarm to the operator interface (refer to Unit Shutdown for additional information).

d. Speed Control: The purpose of the supply fan control is to maintain a minimum static pressure in the supply ductwork to ensure proper terminal air box operation. Install a pitot tube in the main supply duct located near the end of the main supply duct (verify location with Engineer prior to installation) and pipe to a duct mounted differential pressure transmitter. The inputs to the differential pressure transmitter shall be the static pressure inside of the duct and outside of the duct. The output from the differential pressure transmitter shall be directly wired to the associated VFD controller. The DDC system shall control the supply fan VFD from this signal using a 4-20mA output. Initial setpoint shall be +1.0" W.C. (adj.). Final setpoint shall be optimized by the Balancing Contractor.

On a decrease in system load, the DDC system shall utilize feedback from all terminal air box positions to reset and reduce the supply duct differential static pressure until one terminal air box damper is 95% open. On an increase in system load, the DDC system shall utilize feedback from all terminal air box positions to increase the supply duct differential static pressure (not-to-exceed the final setpoint) until one terminal air box damper is 95% open.

e. High Pressure Limit: Install a pitot tube located in the air handling unit main discharge duct immediately downstream of the fan and upstream of any dampers and pipe to a duct mounted differential pressure switch. Wire in series with the start/stop control of the supply fan. Differential pressure switch shall be a manual reset type, and the DDC system shall monitor the status of the differential pressure switch. Initial setpoint shall be +2.0" W.C. (adj.).

f. Low Pressure Limit: Install a pitot tube located in the air handling unit immediately downstream of the prefilter and pipe to a unit mounted differential pressure switch. Wire in series with the start/stop control of the supply fan. Differential pressure switch shall be a manual reset type, and the DDC system shall monitor the status of the differential pressure switch. Initial setpoint shall be -2.0" W.C. (adj.).

3. Return Fan:

a. Start/Stop: The DDC system shall start the return fan via the VFD with a time delay to allow all fire/smoke and smoke dampers in the air handling system to open prior to return fan operation.

b. VFD Reset: The ATC shall wire from the fault detection output contacts in the VFD to the DDC system. In case of VFD fault detection, the DDC system shall wait 30 seconds (adj.) and then call the VFD to start. If the VFD does not start, the DDC system shall call a second time. If the VFD still has not started, an alarm shall be sent to the operator interface.

c. Current Status Switch: Install a current status switch to prove return fan operation. Locate switch so it can sense fan status when operated by the VFD or in bypass mode. If the current status switch does not prove operation, the unit shall shut down and send an alarm to the operator interface (See Unit Shutdown for additional information).

d. Speed Control: The purpose of the return fan control is to maintain a slightly positive building pressure, +0.05” W.C. (adj.). The return fan VFD shall modulate to maintain a constant cfm offset from the supply fan to account for total exhaust from the building while maintaining a slightly positive pressure. Provide an adjustable frequency offset algorithm for the return fan relative to the supply fan. Work with the balancer to establish the correct return fan VFD speed relative to the supply fan speed to achieve correct airflow balance at 100% of the maximum supply cfm and at 50% of the maximum supply cfm. A linear equation shall then be developed for the return fan speed (e.g. y=mx+b). Because the supply fan maintains a minimum static pressure regardless of cfm, the return fan will operate over a wider speed range for a given cfm variation. A simple return fan speed offset (e.g. RF Speed % = SF Speed % - 10% or RF Speed % = 0.8 * SF Speed %) is not acceptable.

e. Low Pressure Limit: Install a pitot tube located in the return ductwork immediately upstream of the return fan and pipe to the duct mounted differential pressure switch. Wire in series with the start/stop control of the return fan. Differential pressure switch shall be a manual reset type and the DDC system shall monitor the status of the differential pressure switch. Initial setpoint shall be -2.0" W.C. (adj.).

4. Filters:

   a. Install a differential static pressure switch across each filter bank.

      1) For each 30% filter bank, provide an alarm to the operator interface when the differential static pressure exceeds 0.6" W.C. (adj.).

      2) For each 60% filter bank, provide an alarm to the operator interface when the differential static pressure exceeds 1.0" W.C. (adj.).

5. Discharge Air Control:

   a. Install an averaging type temperature sensor that serpentines the supply duct downstream of the supply fan. Install a single point type temperature sensor upstream of the return fan. Install a humidity sensor in the return ductwork just upstream of the air handling unit.

   b. Discharge Air Temperature Setpoint: Discharge air temperature setpoint shall be 55ºF (adj.). If the discharge air temperature is more than 10ºF (adj.) above or below the setpoint, an alarm shall be sent to the operator interface and the ventilation air control shall be overridden as follows: Outside air, return air, and relief air dampers shall modulate to maintain discharge air temperature setpoint.

   c. Whenever the discharge air temperature is above the setpoint, the following shall occur in sequence:

      1) The heating coil control valve(s) shall modulate closed.

      2) If the outside air enthalpy is below the return air enthalpy, the outside air damper shall modulate open. This shall continue until the setpoint is achieved or the damper is in the 100% outside air position.

      3) If the outside air enthalpy is above the return air enthalpy, the outside air damper(s) shall close. The minimum outside air damper shall remain open.

      4) If the setpoint cannot be achieved by modulation of the outside air damper, the DDC system shall modulate the chilled water control valve(s) open.

   d. Whenever the discharge air temperature is below the setpoint, the following shall occur in sequence:

      1) The chilled water control valve(s) shall modulate closed.

      2) If the outside air enthalpy is below the return air enthalpy, the outside air damper shall modulate closed. The minimum outside air damper shall remain open.

3) If the setpoint cannot be achieved by damper modulation and the mixed air temperature is above 40ºF (adj.), the heating coil control valve shall modulate open. Face and bypass dampers shall be fully open to the coil. If the setpoint cannot be achieved by damper modulation and the outside air temperature" is below 40ºF (adj.), the heating coil control valve(s) shall be fully open and the face and bypass dampers shall modulate to maintain setpoint.

6. Ventilation Air Control:

a. Minimum Outside Air: Whenever the air handling unit is in occupied mode, the outside air damper shall be open to at least its minimum position.

b. Mixed Air Temperature: Install an averaging type temperature sensor that serpentines the heating coil in the mixed air chamber 2" upstream of the heating coil. Minimum element length shall be one foot per square foot of duct area. This sensor is for monitoring the mixed air temperature.

c. Airflow Station: Install an air flow measuring station in the minimum outside air duct. The output from the air flow measuring station shall be an input to the DDC system. The DDC system shall convert the input into a volume flow rate (cfm). The return air damper and the relief air damper shall modulate in opposition to maintain the minimum scheduled outside air cfm.

d. Carbon Dioxide: Install a carbon dioxide sensor in the return ductwork just upstream of the air handling unit. The outside air damper shall have a minimum position that corresponds to 5% (adj.) of full airflow. The outside air damper shall modulate to maintain a return air carbon dioxide level of 700 ppm (adj.) above the outside air reference carbon dioxide level. The mixed air temperature shall not be allowed to fall below 35°F. An alarm shall be sent to the operator interface if the return air carbon dioxide level exceeds 1800 ppm. The outside airflow quantity shall be the maximum of the discharge air control or carbon dioxide control.

7. Mixed Air Temperature:

a. Install an averaging type temperature sensor that serpentines the preheat coil in the mixed air chamber 2" upstream of the preheat coil. Minimum element length shall be one foot per square foot of duct area. This sensor is for monitoring the mixed air temperature.

8. Low Limit:

a. Install an electric low limit switch, located downstream of the heating coil per manufacturer's recommendation, to close all outside air dampers if the temperature downstream of the heating coil drops below 40ºF (adj.). The electric low limit shall act

independently of the DDC system via relays and shall override the DDC system. A second set of contacts shall notify the DDC system that shall send a trouble signal to the operator interface (Automatic reset type).

b. Install an electric low limit switch, located downstream of the heating coil per manufacturer's recommendation, shall act independently of the DDC system via relays and shall override the DDC system to shut down the unit (refer to Unit Shutdown for additional information) if the temperature downstream of the heating coil drops below 35ºF (adj.). A second set of contacts shall notify the DDC system that shall send an alarm to the operator interface (Manual reset type).

9. Fire Alarm Interface:

a. Upon actuation of the fire alarm system, each fan motor shall be deactivated by a fire alarm relay (refer to Unit Shutdown for additional information). The deactivation of the fan motors via fire alarm relays shall be independent of the DDC system. The fire alarm system shall notify the operator interface whenever an alarm condition is experienced.

10. Unit Shutdown:

a. The supply fan(s) and return fan(s) shall stop.

b. The outside air damper and relief damper shall close and the return damper shall open.

c. The chilled water control valve shall close.

d. The heating coil control valve(s) shall close. Freezestat shall override heating control valve(s) as required.

e. All fire/smoke and smoke dampers associated with the air handling system shall close.

11. Unoccupied Control:

a. Occupied/unoccupied schedule shall be set at the operator interface.

b. The supply and return fan(s) shall shut down.

c. The outside air damper shall close and the return air damper shall open.

d. If any of the space temperatures fall below 60ºF (adj.), the DDC system shall restart the supply fan and cooling capabilities shall be disabled. The fan shall continue running until the space temperature rises 5ºF (adj.).

e. If any of the space temperatures rise above 80ºF (adj.), the DDC system shall restart the supply fan and maintain the discharge air temperature setpoint. The fan shall continue running until the space temperature falls 5ºF (adj.).

f. Heating Optimum Start-Up:

1) This cycle shall override the unoccupied cycle. If the system was operating as a result of the unoccupied cycle, the system shall continue to operate. The DDC system shall measure each of the space temperatures and the "outside air dry bulb reference temperature" to determine the minimum runtime to warm the spaces to their setpoint. When the computed start time is reached, the DDC system shall start the air handling system and operate with the outside air damper closed and the return air damper open. The air handling unit discharge air temperature shall be maintained at a setpoint of 85ºF (adj.). The system shall continue to operate in this mode until all temperatures exceed a setpoint of 65ºF (adj.). At that time, the DDC system shall switch to occupied control. The ventilation air control shall be inactive.

g. Cooling Optimum Start-Up:

1) The DDC system shall measure each of the space temperatures and the "outside air dry bulb reference temperature" to determine the minimum runtime to cool the spaces to their setpoint. When the computed start time is reached, the DDC system shall start the air handling system and operate with outside air damper closed and the return air damper open. The air handling unit discharge air temperature shall be maintained at a setpoint of 55ºF (adj.). The system shall continue to operate in this mode until all space temperatures are less than a setpoint of 78ºF (adj.). At that time, the DDC system shall switch to occupied control. The ventilation air control shall be inactive.

B. Exhaust Fan Control:

1. Exhaust Fan:

a. Install a current status switch to prove fan operation. If the current status switch does not prove operation, send an alarm to the operator interface.

b. Fan shall operate and motorized damper shall be open when the building is occupied. Motorized damper shall close on loss of power to fan motor.

1.3 HEATING SYSTEMS

A. Boiler Control:

1. Hot Water Condensing Boiler:

a. Install temperature sensors in heating water supply and return main piping.

b. The boiler shall run at all times.

c. The TCC shall connect the DDC system to the auxiliary contacts provided with the boiler for a general boiler alarm.

d. The boiler will operate on an outdoor air temperature reset schedule.

1) At 10°F (adj.) outside air dry bulb reference temperature, the heating water supply temperature setpoint shall be 140°F (adj.) and shall be reset to 100°F (adj.) at 60°F (adj.) outside air dry bulb reference temperature. Verify minimum heating return water temperature setpoint with boiler manufacturer.

B. Heating Water Pump Control:

1. Start/Stop: The DDC system shall start the lead pump via the VFD whenever the outside air dry bulb reference temperature is below 65°F (adj.). The lag pump shall remain off.

2. VFD Reset: The ATC shall wire from the fault detection output contacts in the VFD to the DDC system. In case of VFD fault detection, the DDC system shall wait 30 seconds (adj.) and then call the VFD to start. If the VFD does not start, the DDC system shall call a second time. If the VFD still has not started, an alarm shall be sent to the operator interface.

3. Current Status Switch: Install a current status switches to prove lead and lag pump operation. Locate switches so they sense pump status when operated by the VFD. If the lead pump current status switch does not prove operation, an alarm shall be sent to the operator interface and the DDC system shall start the lag pump via the VFD. If the lag pump current status switch does not prove operation, a second alarm shall be sent to the operator interface. Sequence shall be repeated twice. If system does not prove operation the lag pump shall remain on.

4. Speed Control: Install a differential pressure sensor across the supply and return piping near the device with the highest pressure drop (Verify location with engineer prior to installation). The output from the differential pressure sensor shall be an input to the DDC system. The DDC system shall control the operating pump VFD from this signal using a 4-20mA output. Initial setpoint shall be 10 psig (adj.). Final setpoint shall be optimized by the Balancing Contractor.

5. The DDC system shall lead/lag the pumps on a weekly basis.

1.4 COOLING SYSTEM

A. Secondary Chilled Water Pump Control:

1. Start/Stop: The DDC system shall start the lead pump via the VFD whenever the chiller control panel is enabled. The lag pump shall remain off.

2. VFD Reset: The ATC shall wire from the fault detection output contacts in the VFD to the DDC system. In case of VFD fault detection, the DDC system shall wait 30 seconds (adj.) and then call the VFD to start. If the VFD does not start, the DDC system shall call a second time. If the VFD still has not started, an alarm shall be sent to the operator interface.

3. Current Status Switch: Install a current status switch to prove lead and lag pump operation. Locate switches so they sense pump status when operated by the VFD or in bypass mode. If the lead pump current status switch does not prove operation, an alarm shall be sent to the operator interface and the DDC system shall start the lag pump via the VFD. If the lag pump current status switch does not prove operation, a second alarm shall be sent to the operator interface. Sequence shall be repeated twice. If system does not prove operation the lag pump shall remain on.

4. Speed Control: Install a differential pressure sensor across the supply and return piping near the device with the highest pressure drop (Verify location with engineer prior to installation). The output from the differential pressure sensor shall be an input to the DDC system. The DDC system shall control the operating pump VFD from this signal using a 4-20mA output. Initial setpoint shall be 10 psig (adj.). Final setpoint shall be optimized by the Balancing Contractor.

5. The DDC system shall lead/lag the pumps on a weekly basis.

3.2 ZONE CONTROLS

A. General:

1. The Balancing Contractor shall measure the TAB airflow and the TCC shall adjust the DDC readout to match.

2. The terminal air box (TAB) is controlled by a direct digital controller (DDC).

3. The TCC shall furnish and install the terminal air box volume controller and damper operator.

4. Dead Band: Where used to control both heating and cooling, zone thermostatic controls shall be capable of providing a temperature range or dead band of at least 5°F within which the supply of heating and cooling energy to the zone is shut off or reduced to a minimum.

B. Terminal Air Box Control:

1. Terminal Air Box Control with Hot Water Reheat (Type A):

a. Each zone has a TAB with a hot water reheat coil, reheat coil control valve, and DDC controller. Install a single point temperature sensor 2'-0" downstream of the reheat coil. Install a wall-mounted temperature sensor to maintain space temperature of 72°F (adj.). Refer to drawings for temperature sensor requirements.

b. At full cooling, the TAB shall be open to maximum cfm position. The reheat coil control valve shall be closed.

c. On a fall in space temperature, the TAB shall modulate closed until space setpoint is maintained or until it reaches its minimum cfm position. The reheat coil control valve shall be closed.

d. On a further fall in space temperature, the TAB and the reheat coil control valve shall modulate open in unison until setpoint is maintained or until specified maximum heating cfm position is reached.

e. If heating water system temperature is 5°F (adj.) below setpoint, on a call for heating, the TAB shall remain at its minimum cfm position.

2. Terminal Air Box Control with Hot Water Reheat and Perimeter Radiation (Type B):

a. Each zone has a TAB with a hot water reheat coil, reheat coil control valve, DDC controller, and perimeter radiation with perimeter radiation control valve. Install a single point temperature sensor 2'-0" downstream of the reheat coil. Install a wall-mounted temperature sensor to maintain space temperature of 72°F (adj.). Refer to drawings for temperature sensor requirements.

b. At full cooling, the TAB shall be open to maximum cfm position. The reheat coil control valve and perimeter radiation control valveshall be closed.

c. On a fall in space temperature, the TAB shall modulate closed until space setpoint is maintained or until it reaches its minimum cfm position. The reheat coil control valve and perimeter radiation control valve shall be closed.

d. On a further fall in space temperature, the perimeter radiation control valve shall modulate open until setpoint is maintained. Perimeter heat shall be locked out above 40°F outside air temperature. On a further fall in space temperature, the TAB and reheat coil control valve shall modulate open until setpoint is maintained or until specified heating cfm position is reached. If heating water system temperature is 5°F (adj.) below setpoint on a call for heating, the TAB shall remain at its minimum cfm position.

3. Terminal Air Box Control - Cooling Only (Type C):

   a. Each zone has a TAB and DDC controller. Install a wall mounted temperature sensor to maintain space temperature of 72°F (adj.). See drawings for temperature sensor requirements.

   b. At full cooling, the TAB shall be open to maximum cfm position.

   c. On a fall in space temperature, the TAB shall modulate closed until space setpoint is maintained, or until it reaches its minimum cfm position.

   d. On a further fall in space temperature, the TAB shall remain at its minimum cfm position.

   e. The DDC system shall utilize feedback from all terminal air box positions to reset the supply duct differential static pressure.

C. Cabinet Heater Control:

1. Hot Water:

   a. Install a remote mounted temperature sensor and control valve. The cabinet heater shall be furnished with a unit mounted fan speed selector switch (Off-High-Med-Low).

   b. When the outdoor air temperature is above 40°F (adj.), the low voltage temperature sensor shall modulate the control valve and cycle the unit fan together to maintain a space temperature of 70°F (adj.). When the outdoor air temperature is below 40°F (adj.), the low voltage temperature sensor shall modulate the control valve to maintain a space temperature of 70°F (adj.) and the unit fan shall run continuously. Send an alarm to the operator interface if space temperature falls 10°F (adj.) below setpoint.

D. Unit Heater Control:

1. Hot Water:

   a. Install a remote mounted temperature sensor and control valve.

   b. When the outdoor air temperature is above 40°F (adj.), the low voltage temperature sensor shall modulate the control valve and cycle the unit fan together to maintain a space temperature of 70°F (adj.). When the outdoor air temperature is below 40°F (adj.), the low voltage temperature sensor shall modulate the control valve to maintain a space temperature of 70°F (adj.) and the unit fan shall run continuously. Send an alarm to the operator interface if space temperature falls 10°F (adj.) below setpoint.

E. Fan Coil Unit Control:

1. Hot Water / Chilled Water Four-Pipe:

a. Install a remote mounted temperature sensor, heating control valve, and cooling control valve. The fan coil unit shall be furnished with a unit mounted fan speed selector switch (Off-High-Med-Low).

b. Modulate the heating and cooling coil control valves to maintain space temperature setpoint. Heating setpoint temperature shall be 70°F (adj.) and cooling setpoint temperature shall be 75°F (adj.). The fan shall run continuously. Simultaneous heating and cooling shall not occur. Send an alarm to the operator interface if the space temperature falls 10°F (adj.) below setpoint.

END OF SECTION 230900

SECTION 232100 - HYDRONIC PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Pipe and Pipe Fittings.

B. Valves.

C. Heating Water Piping System.

D. Glycol Water Piping System.

E. Chilled Water Piping System.

F. Condenser Water Piping System.

G. Heating/Cooling Water Piping System.

H. Acoustical Lagging.

PART 2 - PRODUCTS

2.1 PIPING

A. Piping - 2"and Under:

1. Utilize type L hard drawn seamless copper for all piping in return air plenums.

2. Joints may be soldered, mechanical press, mechanical push-to-connect, mechanically coupled grooved

3. Consider use of AquaTherm or equivalent pipe for hydronic pipe not located in return air plenums.

B. Piping - 2-1/2" and Over:

1. Utilize standard weight black steel, beveled ends, ASTM A53, Type E or S, Grade B for all piping in return air plenums.

2. Joints may be welded, flanged or grooved type with Grade E EPDM molded pressure-responsive gaskets.

3. Consider use of AquaTherm or equivalent pipe for hydronic pipe not located in return air plenums.

a. Grooved type, with Grade E EPDM molded pressure-responsive gaskets suited for 32°F to 230°F per ASTM D2000.

C. After completion, fill, clean, and treat systems.

D. Installation Requirements in Electrical Rooms:

1. Do not install piping or other equipment above electrical switchboards or panelboards. This includes a dedicated space extending 25 feet from the floor to the structural ceiling with width and depth equal to the equipment plus its required clearance space.

E. Provide chain operators for all valves over 2" size that are over 10'-0" above finished floor. Extend to 7'-0" above finished floor.

F. Provide valve position indicator on all valves 10’-0” or greater above finish floor and not located above ceiling.

G. Provide clearance for installation of insulation, and access to valves and fittings.

H. Provide access doors where valves are not exposed.

I. Install balancing valves with the manufacturer’s recommended straight upstream and downstream diameters of pipe.

J. Provide shutoff valves and flanges or unions at all connections to equipment, traps, and items that require servicing.

K. Provide flanges or unions at all final connections to equipment, traps and valves.

L. Arrange piping and piping connections so equipment may be serviced or totally removed without disturbing piping beyond final connections and associated shutoff valves.

2.2 CONDENSER WATER (UNDERGROUND)
CHILLED WATER (UNDERGROUND)

A. HDPE pipe, electro fusion welded.

2.3 SUCTION DIFFUSER

A. A separate strainer shall be provided for inlet to pump.

2.4 EXPANSION TANK

A. Tank shall be welded steel, bladder type, with ASME construction and stamped.

2.5 COALESCING TYPE COMBINATION AIR ELIMINATOR AND DIRT SEPARATOR

A. Coalescing type air eliminator and dirt separator shall be fabricated from steel and ASME constructed and certified for 125 psi working pressure and 270ºF operating temperature. Units 2-1/2 inches and smaller shall have threaded connections. Units 3 inches and larger shall have flanged connections.

B. Air elimination and dirt separation shall be by coalescing action by either:

1. Stainless steel PALL rings.

2. Copper tubes with continuous wound, permanently attached copper wire and followed by a separate continuous wound permanently affixed copper wire.

C. Provide brass flushing cock on the separator side to facilitate system fast-fill and to blow down impurities from the water surface within the separator.

D. Provide factory mounted blow-down valve on the unit bottom to allow for draining and cleaning.

E. Coalescing separators shall be as sized on the construction drawings, but in no case shall it have less than line size connections nor shall pressure drop exceed 1 psi at design flow. Include on submittal the pressure drop of each unit at its design flow rate.

F. Coalescing separators shall be equipped with removable cover to allow for removal, inspection and cleaning of the internal coalescing media.

END OF SECTION 232100

SECTION 232123 - HVAC PUMPS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. All pumps except where integral with a manufactured piece of equipment.

PART 2 - PRODUCTS

2.1 PUMPS - GENERAL

A. Statically and dynamically balance rotating parts.

B. Construction shall permit complete servicing without breaking piping or motor connections.

C. Pump connections shall be flanged, whenever available.

D. Heating pumps shall be suitable for 225ºF water.

2.2 SPLIT CASE BASE MOUNTED PUMPS

A. Preferred pump for larger flow rate pumps.

B. Type: Centrifugal, single stage, double suction, horizontal or vertical split case,

C. Baseplate: Reinforced heavy steel.

D. Acceptable Manufacturers: Bell & Gossett, Taco, Aurora, Armstrong, Grundfos/Peerless/PACO, or equivalent.

2.3 BASE MOUNTED END SUCTION PUMPS

A. Acceptable Manufacturers: Bell & Gossett, Taco, Aurora, Armstrong, Grundfos/Peerless/PACO, or equivalent.

2.4 IN-LINE PUMP

A. Type: Centrifugal, single stage, close coupled in-line, back pullout design, suitable

B. Acceptable Manufacturers: Bell & Gossett, Taco, Aurora, Armstrong, Grundfos/Peerless/PACO, or equivalent.

END OF SECTION 232123

SECTION 235216 - CONDENSING BOILERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Boilers.

B. Controls and Boiler Trim.

C. Boiler Vent Flue.

PART 2 - PRODUCTS

2.1 BOILERS

A. General Requirements:

1. Pipe safety relief valve and condensate trap to nearest floor drain. Route condensate pipe to acid resistant floor drain. Provide neutralization kit and water cooler as required.

B. Combustion Inlet and Venting:

1. Provide complete sealed combustion inlet and venting system.

2. Slope all horizontal runs of exhaust vent towards the boilers at a slope of 1” per 4’.

C. Service Clearance:

1. Install the boilers with a minimum of three feet clear space behind them for installation of piping and services. Verify exact maintenance clearances required by the manufacturer prior to installation.

D. Prepare and start systems under factory authorized supervision.

E. Provide field representative for starting unit and training operator.

F. Provide combustion test and submit report. Test shall include boiler firing rate, overfire draft, gas flow rate, heat input, burner manifold gas pressure, percent carbon monoxide (CO), percent oxygen (O_2), percent excess air, flue gas temperature at outlet, ambient temperature, net stack temperature, percent combustion efficiency, and heat output.

G. Acceptable Manufacturer: Lochinvar, Aerco International, Inc,, Cleaver Brooks (Clear Fire), Viessmann, Raypak (Xfrye, Xtherm), Hydrotherm (KN), or equivalent.

2.2 HEAT EXCHANGER

A. Condensing, fire tube design surrounded by water that is suitable for return water temperatures as low as 50ºF.

B. Ten-year non-prorated warranty against leakage due to thermal shock or corrosion.

2.3 BOILER FLUE

A. The boiler flue shall be of material approved by the manufacturer. Vent piping shall be UL listed for use with category III and IV appliances with operating temperatures of up to 480°F.

2.4 HOT WATER BOILER TRIM

A. Provide ASME safety relief valve set at 125 psi or boiler maximum allowable working pressure.

B. Provide neutralization kit for condensate treatment prior to entering sanitary system.

C. Burner to be modulating with a minimum turndown ratio of 5:1.

2.5 CONTROL PANEL

A. The boiler system control panel shall include contacts for a trouble alarm to the DDC system. Provide BACnet MS/TP interface and connect to the DDC system.

B. Program relay to control ignition, starting and stopping of burner and provide both pre-combustion purge and post combustion purge. Burner to shut down in event of ignition, or main flame failure. Interlock to shut down burner upon combustion air pressure drop.

C. Manual-automatic selector switch to permit automatic firing in accordance with load demand, or manual control of firing rate at fixed temperature.

D. Panel to include indicating lights to show fault conditions of low water level, flame failure, fuel pressure, exhaust temperature, water temperature, or combustion air pressure. Mount indicating lights and switches in hinged drop-panel for access to wiring.

E. The boiler system control panel shall include contacts for a manual CSD-1 emergency shutdown switch. The switch shall be furnished, installed, and wired by the Electrical Contractor. Switch shall be located at each exit just outside the boiler room door. If boiler room door is on exterior of building, the switch shall be located just inside the door. The switch shall disable all boilers and shall be wired to the boiler burner safety control circuit to interrupt burner operation.

F. The boiler shutdown switch shall be an emergency stop, mushroom head with N.C. contact, turn to release switch with engraved nameplate to read “BOILER EMERGENCY SHUTOFF”.

G. For multiple boiler systems, furnish a boiler management system consisting of controller(s) capable of stopping, starting, and modulating all boilers to maintain maximum efficiency of the boiler plant. The boiler management system shall include all alarms, control points, and setpoints specified.

END OF SECTION 235216

SECTION 236416 - AIR AND WATER COOLED CHILLERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Chiller Package.

PART 2 - PRODUCTS

2.1 PREFERED MANUFACTURERS

A. Trane

B. York

C. Daikin

D. Or equivalent.

2.2 PIPING REQUIREMENTS:

A. Provide connections to chilled water piping. On inlet, provide well for temperature sensor, thermometer and well, strainer, flow switch, flexible connector, pressure gauge, two-position control valve, and shutoff valve. On outlet, provide thermometer and well, flexible connector, pressure gauge, and shutoff balancing valve.

B. Provide connections to condenser water piping. On inlet, provide well for temperature limit controller, thermometer and well, strainer, flow switch, flexible connector, pressure gauge, two-position control valve, and shutoff valve. On outlet, provide thermometer and well, flexible connector, pressure gauge, and shutoff balancing valve.

C. Arrange piping for easy dismantling for tube cleaning.

2.3 PROVIDE BACNET MS/TP INTERFACE AND CONNECT TO THE DDC SYSTEM

2.4 MANUFACTURER'S FIELD SERVICES

A. Prepare and start systems.

END OF SECTION 236416

SECTION 237313 - AIR HANDLING UNITS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Modular Indoor Air Handling Units and Rooftop Units.

B. SUBMITTALS: Submit certification that modular air handing units, accessories, and components will withstand seismic forces.

1. Basis for Certification: Indicate whether certification is based on actual test of assembled components or on calculation.

a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

1.2 EXTRA STOCK

A. Provide clean filters in all units at time of installation.

B. Provide clean filters in all units at project final completion after all interior finishes are complete.

C. Provide one additional set of replacement filters for all units. Deliver to Owner at job site.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site with protective coverings in-place. Loose shipped items must be in factory-provided protective coverings, with factory-installed shipping skids and lifting lugs.

B. Store unit in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

PART 2 - PRODUCTS

2.1 AIR HANDLING UNITS

A. Preferred Manufacturers

1. Trane – “CSI, CSOA. CSAA

2. Daikin – Vision, Skyline.

3. York – Solutions.

4. Or equivalent.

B. Housing:

1. Removable access panels for coil and fan removal.

2. Install a stainless steel drain pan under each cooling coil meeting requirements as outlined in ASHRAE 62.1. Extend drain pans the entire width of each coil, including piping and header if in the air stream, and from the upstream face of each coil to a distance 1/2 of the vertical coil height downstream from the downstream face. Pitch drain pans in two directions towards the outlet, with a slope of at least 1/8” per foot. Bottom of drain pan shall be insulated.

C. Coils

1. Maximum air velocity through coil shall not exceed 500 fpm.

2. Coils shall have drain and vent connections at supply and return headers with valves. Extend valving outside of the unit casing.

2.2 PROVIDE BACNET MS/TP INTERFACE AND CONNECT TO THE DDC SYSTEM.

2.3 GENERAL INSTALLATION REQUIREMENTS

A. During construction provide temporary closures of metal or taped polyethylene over openings into housing ducts to prevent dust from entering ductwork.

B. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

C. Final equipment shall not be used for space conditioning during construction.

END OF SECTION 237313

SECTION 238200 - TERMINAL HEAT TRANSFER UNITS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Fan Coil Units.

B. Unit Ventilators.

PART 2 - PRODUCTS

2.1 FAN COIL UNITS

A. All motors shall be three-speed permanent split capacitor with integral thermal overload protection.

[***OR*****]**

B. All motors shall be electronically commutated motor (ECM) with integral thermal overload protection.

C. Provide auxiliary drain pan to collect condensation in the valve compartment.

D. Provide condensate piping and tie into drainage system.

E. Filters: 1" woven glass fiber disposable type.

F. Provide a concealed unit-mounted disconnect.

G. Provide oversized left and right end piping compartments.

H. Units shall have separate heating and cooling coils.

I. Supply with separate temperature sensor that is BACnet MS/TP capable by manufacturer or controls contractor.

J. Provide with pressure transmitter for filter status by manufacturer or controls contractor.

K. Provide with high-limit water sensor in drain pan and connect to the DDC system.

L. Acceptable Manufacturers: IEC, Price, Trane, Daikin, Air Therm, or equivalent.

2.2 UNIT VENTILATORS

A. Unit ventilators shall not be utilized.

END OF SECTION 238200

SECTION 260513 - WIRE AND CABLE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Building wire

B. Armored cable (AC)

C. Metal-clad cable (MC)

1.2 BUILDING WIRING

A. All power wiring is to utilize stranded wires, unless approved by Owner.

B. There shall be no shared neutrals.

C. All wiring to be terminated with conical active wire connectors (wire nuts) where appropriate.

PART 2 - PRODUCTS

2.1 BUILDING WIRE

A. Feeders and Branch Circuits Larger Than 6 AWG: Copper, stranded conductor, 600-volt insulation, THHN/THWN or XHHW-2.

B. Feeders and Branch Circuits Larger than 6 AWG in Underground Conduit: Copper, stranded conductor, 600 volt insulation, THWN or XHHW-2.

C. Feeders and Branch Circuits 6 AWG and Smaller: Copper conductor, 600 volt insulation, THHN/THWN stranded conductor, unless otherwise noted on the drawings.

D. Motor Feeder from Variable Frequency Drives: Copper conductor, 600 volt XHHW-2 insulation, stranded conductor, unless otherwise noted on the drawings. Three conductor stranded coverall helical copper tape shield. Shield shall be terminated at both ends of cable with an approved termination.

2.2 ARMORED CABLE (AC)

A. Conductors shall be copper, 600 volt insulation, THHN. Armored cable shall be constructed in strict accordance with Underwriters Laboratories, Inc. Standard for Armored Cables, UL 4, and include flexible metallic interlocked armor.

B. Minimum conductor size for branch circuit wiring shall be 12 AWG, with larger wires used where specified.

C. Armored cables may only be used for branch circuit wiring to final light fixture connection (not to exceed 6'-0" in length) as defined in NEC 320, subject to acceptance by State and local codes.

D. Armored cable shall **NOT** be used for circuits serving the Essential Electrical System.

2.3 METAL-CLAD CABLE (MC)

A. Conductors shall be copper, 600 volt insulation, THHN. Metal clad cable shall be constructed in strict accordance with Underwriters Laboratories, Inc. Standard for Metal-Clad Cables, UL 15694, exterior of metal interlocked armor.

B. Minimum conductor size for branch circuit wiring shall be 12 AWG, with larger wires used where specified.

C. Metal-clad cables shall only be used for branch circuit wiring to final light fixture connection (not to exceed 6'-0" in length) as defined in NEC 330, subject to acceptance by State and local codes.

D. Metal-clad cable shall **NOT** be used for circuits serving the Essential Electrical System.

END OF SECTION 260513

SECTION 260526 - GROUNDING AND BONDING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Equipment grounding system

B. Bonding system

C. Grounding electrode system

PART 2 - PRODUCTS

2.1 GROUNDING CONDUCTORS

A. For insulated conductors, comply with Division 26 05 13 "Wire and Cable".

B. Material: Copper.

C. Equipment Grounding Conductors: Insulated with green-colored insulation.

D. Grounding Electrode Conductors: Stranded cable.

E. Underground Conductors: Bare, tinned, stranded, unless otherwise indicated.

F. Sizes and types below are typical. Adjust to suit Project conditions and requirements.

G. Copper Bonding Conductors: As follows:

H. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, 1/4 inch in diameter.

I. Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.

J. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

K. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.2 CONNECTOR PRODUCTS

A. Comply with UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.

B. Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.

C. Bolted Connectors: Bolted-pressure-type connectors.

D. Substation connectors shall comply with IEEE 837 listed for use for specific types, sizes, and combinations of conductors and connected items.

2.3 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel.

END OF SECTION 260526

SECTION 260533 - CONDUIT AND BOXES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Rigid metallic conduit and fittings

B. Electrical metallic tubing and fittings

C. Flexible metallic conduit and fittings

D. Liquidtight flexible metallic conduit and fittings

E. Rigid polyvinyl chloride conduit and fittings

F. Wall and ceiling outlet boxes

G. Electrical connection

H. Pull and junction boxes

1.2 CONDUIT INSTALLATION

A. All underground conduits that will sweep to above grade shall have RMC 90° elbow to 6” above grade.

B. All underground conduits feeding a facility shall transition to RMC once within 5’-0” of entering the building’s footprint.

C. RMC conduit to be utilized in areas where conduit system could be damaged - IE: Loading Docks, Central Plant, building exterior, pathways that accommodate motorized equipment, etc.

PART 2 - PRODUCTS

2.1 RIGID METALLIC CONDUIT (RMC) AND FITTINGS

A. Acceptable Manufacturers:

1. Acceptable Manufacturers: Allied, LTV, Steelduct, Wheatland Tube Co, O-Z Gedney, or approved equal.

2. Acceptable Manufacturers of RMC Conduit Fittings: Appleton Electric, O-Z/Gedney Co., Electroline, Raco, Bridgeport, Midwest, Regal, Thomas & Betts, Crouse-Hinds, Killark, or approved equal.

D. Minimum Size Galvanized Steel: 3/4 inch (19mm), unless otherwise noted.

E. Fittings and Conduit Bodies:

1. End Bell Fittings: Malleable iron, hot dip galvanized, threaded flare type with provisions for mounting to form.

F. PVC Externally Coated Conduit: Compliant with UL 6, ANSI C80.1 and NEMA RN 1; rigid galvanized steel conduit with external 40 mil PVC coating and internal 2 mil urethane coating surface. All fittings and conduit bodies shall be complete with coating. Threads shall be hot galvanized and coated with a clear coat of urethane. The PVC coated system shall include necessary PVC coated fittings, boxes and covers to form a complete encapsulated system. Acceptable Manufacturers: Robroy, T&B Ocal or approved equal.

2.2 ELECTRICAL METALLIC TUBING (EMT) AND FITTINGS

A. Minimum Size Electrical Metallic Tubing: 3/4 inch, unless otherwise noted.

B. Acceptable Manufacturers of EMT Conduit: Allied, LTV, Steelduct, Wheatland Tube Co, or approved equal.

C. Fittings and Conduit Bodies:

1. 2" Diameter or Smaller: Steel set screw type of steel designed for their specific application.

2. Larger than 2": Steel set screw type of steel designed for their specific application.

3. Acceptable Manufacturers of EMT Conduit Fittings: Appleton Electric, O-Z/Gedney Co., Electroline, Raco, Bridgeport, Midwest, Regal, Thomas & Betts, or approved equal.

2.3 FLEXIBLE METALLIC CONDUIT (FMC) AND FITTINGS

A. Minimum Size Galvanized Steel: 3/4 inch, unless otherwise noted.

B. Acceptable Manufacturers: American Flex, Alflex, Electri-Flex Co, or approved equal.

C. Construction: Flexible steel, approved for conduit ground, zinc coated, threadless type formed from a continuous length of spirally wound, interlocked zinc coated strip steel. Provide a separate equipment grounding conductor when used for equipment where flexibility is required.

D. Fittings and Conduit Bodies:

1. Threadless hinged clamp type, galvanized zinc coated cadmium plated malleable cast iron or screw-in type, die-cast zinc.

2. Fittings and conduit bodies shall include plastic or cast metal inserts supplied by the manufacturer to protect conductors from sharp edge

2.4 LIQUIDTIGHT FLEXIBLE METALLIC CONDUIT (LFMC) AND FITTINGS

A. Acceptable Manufacturers: Anaconda Type UA, Electri-Flex Type LA, Alflex, Carlon (Lamson & Sessions), or approved equal.

B. Construction: Flexible steel, approved for conduit ground, zinc coated, threadless type formed from a continuous length of spirally wound, interlocked zinc coated strip steel and an extruded PVC cover.

C. Fittings and Conduit Bodies:

1. Watertight, compression type, galvanized zinc coated cadmium plated malleable cast iron, UL listed.

2. Fittings and conduit bodies shall include plastic or cast metal inserts supplied by the manufacturer to protect conductors from sharp edges.

3. Acceptable Manufacturers: Appleton Electric, O-Z/Gedney Co., Electroline, Bridgeport, Thomas & Betts, Midwest, Regal, Carlon (Lamson & Sessions), or approved equal.

2.5 RIGID NON-METALLIC CONDUIT (PVC) AND FITTINGS

A. Minimum Size Rigid Smooth-Wall Nonmetallic Conduit: 3/4 inch, unless otherwise noted.

B. Acceptable Manufacturers: Carlon (Lamson & Sessions) Type 40, Cantex, J.M. Mfg., or approved equal.

C. Construction: Schedule 40 and Schedule 80 rigid polyvinyl chloride (PVC), UL labeled for 90°C.

D. Fittings and Conduit Bodies: NEMA TC 3; sleeve type suitable for and manufactured especially for use with the conduit by the conduit manufacturer.

E. Plastic cement for joining conduit and fittings shall be provided as recommended by the manufacturer.

2.6 OUTLET BOXES

A. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1; galvanized steel, minimum of 14 gauge, with 1/2 inch male fixture studs where required.

B. Nonmetallic Outlet Boxes: ANSI/NEMA OS 2.

C. Cast Boxes: NEMA FB1, Type FD, Aluminum or cast feralloy, deep type, gasketed cover, threaded hubs.

D. Outlet boxes for luminaires to be not less than 1-1/2" deep, deeper if required by the number of wires or construction. The box shall be coordinated with surface luminaires to conceal the box from view or provide a finished trim plate.

E. Switch outlet boxes for local light control switches, dimmers and occupancy sensors shall be 4 inches square by 2-1/8 inches deep, with raised cover to fit flush with finish wall line. Multiple gang switch outlets shall consist of the required number of gang boxes appropriate to the quantity of switches comprising the gang. Where walls are plastered, provide a plaster raised cover. Where switch outlet boxes occur in exposed concrete block walls, boxes shall be installed in the block cavity with a raised square edge tile cover of sufficient depth to extend out to face of block or masonry boxes.

F. Outlet boxes for telephone substations in walls and columns shall be 4 inches square and 2-1/8 inches deep with single gang raised cover to fit flush with finished wall line equipped with flush telephone plate.

G. Wall or column receptacle outlet boxes shall be 4 inches square with raised cover to fit flush with finished wall line. Boxes in concrete block walls shall be installed the same as for switch boxes in block walls.

2.7 ELECTRICAL CONNECTION

A. Electrical connection to equipment and motors, sized per NEC. Coordinate requirements with contractor furnishing equipment or motor. Refer to specifications and general installation notes for terminations to motors.

2.8 PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: ANSI/NEMA OS 1; galvanized steel.

B. Sheet metal boxes larger than 12 inches in any dimension that contain terminations or components: Continuous hinged enclosure with 1/4 turn latch and white back panel for mounting terminal blocks and electrical components.

C. Cast Metal Boxes for Outdoor and Wet Location Installations: NEMA 250; Type 4 and Type 6, flat-flanged, surface-mounted junction box, UL listed as raintight. Galvanized cast iron box and cover with ground flange, neoprene gasket, and stainless steel cover screws.

END OF SECTION 260533

SECTION 260553 - ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Equipment naming convention.

B. Equipment labeling

1.2 EQUIPMENT NAMING CONVENTION

A. All new electrical equipment shall receive a designation consisting of a building number (four characters - contact Campus personnel for the building numbers), an equipment code (three characters), and then a floor level followed by the actual equipment number (four characters).

B. Equipment Code - the first three characters equipment type:

1.	AC Motor	ACM
2.	Automatic Transfer Switch	ATS
3.	Automatic Transfer Switch - Life Safety	ATL
4.	Capacitor Bank - Power Factor Correction	CAP
5.	Branch Circuit Panel - Normal Power 480V.	NHP
6.	Branch Circuit Panel - Normal Power 208V.	NLP
7.	Branch Circuit Panel - Emerg. Power 480V.	EHP
8.	Branch Circuit Panel - Emerg. Power 208V.	ELP
9.	Distribution Panel - Normal Power 480V.	NHD
10.	Distribution Panel - Normal Power 208V.	NLD
11.	Distribution Panel - Emerg. Power 480V.	EHD
12.	Distribution Panel - Emerg. Power 208V.	ELD
13.	Switchboard - Normal Power 480V.	NHS
14.	Switchboard - Normal Power 208V.	NLS
15.	Switchboard - Emerg. Power 480V.	EHS

16.	Switchboard - Emerg. Power 208V.	ELS
17.	Transformer (Dry Type) - Normal Power	NTD
18.	Transformer (Dry Type) - Emerg. Power	ETD
19.	Transformer (Liquid Type) - Normal Power	NTL
20.	Transformer (Liquid Type) - Emerg. Power	ETL
21.	Disconnect/Safety Switch	DSW
22.	Emergency Generator	GEN
23.	Uninterruptible Power Supply	UPS
24.	Fire Alarm Panel	FAP
25.	Remote Annunciator Panel	RAP

EXAMPLE: **7006/NHD/2002** = Dunham Hall, Normal Power 480V Distribution Board, located on the Second Floor, the second Distribution Board on that level.

EXAMPLE: **7018/FAP/B001** = Founders Hall, Fire Alarm Panel, located in the Basement, the first Fire Alarm Panel on that level.

PART 2 - PRODUCTS

2.1 NAMEPLATES AND SIGNS

A. Installing contractor shall provide a label for all new equipment per these specifications.

B. Engraved, Plastic-Laminated Labels, Signs and Instruction Plates: Engraving stock melamine plastic laminate, 1/16-inch minimum thick for signs up to 20 square inches, or 8 inches in length; 1/8 inch thick for larger sizes. Labels shall be punched for mechanical fasteners. Engraving legend shall be as follows:

1. Black letters on white face for normal power.

2. White letters on red face for emergency power.

3. White letters on green face for grounding.

4. Black letter on yellow face for Caution or UPS.

C. Baked–Enamel Signs for interior Use: Preprinted aluminum signs, punched, or drilled for fasteners, with colors, legend, and size required for application. Mounting ¼" grommets in corners.

D. Exterior, Metal-Backed, Butyrate Signs: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with .0396 inch galvanized-steel backing: and with colors, legend, and size required for application. Mounting ¼" grommets in corners.

E. Safety Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145.

2.2 Fasteners for Plastic-Laminated Signs: Self-tapping stainless steel screws or number 10/32 stainless steel machine screws with nuts and flat and lock washers.

END OF SECTION 260553

SECTION 26 09 43.13
Digital-Network Lighting Controls

SECTION 26 09 43.13
Digital-Network Lighting Controls

PART 1 GENERAL

1.1 SUMMARY

1.1 Section Includes:

1. Networked Central Lighting Control systems. Systems are composed of:
    a. Network integrated power switching systems.
    b. Network integrated dimming systems.
    c. Standalone power switching and dimming systems.
    d. Automation control processors.
    e. Sensors
    f. User Interfaces:
        1) Keypad
        2) Touch screen
        3) Virtual touch screen
2. System Functions and Sequences

A. Related Requirements:

1. Section 12 24 13 Roller Window Shades
2. Section 25 08 00 Commissioning of Integrated Automation
3. Section 25 10 00 Integrated Automation Network Equipment
4. Section 25 11 13 Integrated Automation Network Servers
5. Section 25 13 13 Integrated Automation Control and Monitoring Network Supervisory Control
6. Section 25 13 19 Integrated Automation Control and Monitoring Network Interoperability
7. Section 25 15 16 Integrated Automation Software for Control and Monitoring Networks
8. Section 26 05 00 Common Work Results for Electrical
9. Section 26 27 26 Wiring Devices
10. Section 26 51 00 Interior Lighting
11. Section 27 15 00 Communications Horizontal Cabling
12. Section 27 41 00 Audio-Video Systems

1.2 REFERENCES

A. Definitions

1. Control: Effecting a change in state by one PC program onto a microprocessor or device.
2. Scene: Predetermined light level of a single fixture of group of fixtures.
3. DALI: Digital addressable lighting interface.
4. RS-485: A serial network protocol complying with TIA-485-A.
5. UTP: Unshielded twisted pair.

B. Reference Standards

1. California Energy Commission (CEC):

2. CEC CCR Title 24, Part 6: California Energy Efficiency Standards for Residential and Nonresidential Buildings, California's Appliance Energy Efficiency program: Listed for lighting control devices.

3. National Fire Protection Association (NFPA):

4. NFPA 70 - National Electrical Code.

5. Underwriters Laboratories (UL)

   a. UL 508 – Industrial Control Equipment.

   b. UL924 – Emergency Lighting and power Equipment.

   c. UL1008 – Transfer Switch Equipment.

1.3 Requirements

A. Coordination

1. Contractor shall place daylight and occupancy sensors per plans to achieve optimal performance. Proper placement shall be coordinated with others in order to avoid interference with prescribed lighting levels.

2. Contractor shall provide luminaries and lamps that are compatible with the lighting control system to be installed.

3. Contractor shall locate touch screen and keypad stations as per plans.

4. Contractor shall notify engineer of record of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.4 SYSTEM DESCRIPTION

A. Web Accessible, network connected, lighting control system utilizing preset control software, central signal microprocessor, lighting control panel including integrated branch circuit protection, and [power switching modules and relays] [Dimming Modules] [DALI Control Modules] [Sensors User Interfaces].

B. System Components: System includes the following addressable components:

1. Keypad controls.

2. Touch screen controls.

3. Window treatment controls.

4. Remote occupancy sensors.

5. Lighting load shedding.

6. Timed room lighting.

7. Daylight compensating lighting controls.

8. Communication interface to facility-wide room management system.

9. Communication interface to building automation system gateway/interface.

1.5 SUBMITTALS

A. Product Data: For each type of product required for complete network lighting control system, demonstrating compliance with requirements.

B. Shop Drawings: Indicated the following:

1. Schematic diagram showing complete network lighting control system and accessories.

2. Circuits and emergency circuits with capacity and phase, control zones, load type and voltage per circuit.

1.6 CLOSEOUT SUBMITTALS

A. Operating and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualification: Manufacturer of network lighting controls with minimum [five] years record of satisfactory manufacturing and support of components comparable to basis of design system.

B. Source Requirements: Provide Network Lighting System through a single source from a single manufacturer.

C. Manufacturer Qualifications: Approved manufacturer of network lighting controls listed in this Section with minimum [five] years record of satisfactory manufacturing and support of components comparable to basis of design system.

1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:

a. Product data, including certified independent test data indicating compliance with requirements.

b. Samples of each component.

c. Sample submittal from similar project.

d. Project references: Minimum of 5 installations not less than 5 years old, with Owner and Architect contact information.

e. Sample warranty.

2. Substitutions following award of contract are not allowed except as stipulated in Division 01 General Requirements.

D. Approved manufacturers must comply with separate requirements of Submittals Article.

E. Electrical Components, Devices, and Accessories: UL listed and labeled per NFPA 70.

F. California Appliance Efficiency Listing: Provide products that comply with provisions of CEC CCR Title 24, Part 6.

1.8 COORDINATION

A. Coordinate integrated lighting and dimming controls with systems and components specified in the following sections:

1. Division 11 Section "Audio-Visual Equipment".
2. Division 12 Section "Window Treatments".
3. Division 23 Section "Instrumentation and Control for HVAC".
4. Division 25 Section "Integrated Automation Control of Electrical Systems".
5. Division 26 Section "Panelboards".
6. Division 26 Section "Wiring Devices".
7. Division 26 Section "Lighting Devices".
8. Division 26 Section "Interior Lighting".
9. Division 27 Section "Communications Horizontal Cabling".
10. Division 27 Section "Audio-Video Systems"
11. Division 28 Section "Electronic Access Control and Intrusion Detection".

1.9 PROJECT CONDITIONS

A. Environmental Conditions Range:

1. Temperature: 32 – 104 deg F (0 - 40 deg C).
2. Relative Humidity: 10 – 90 percent, noncondensing.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of modular dimming controls system the fail in materials or workmanship within the specified warranty period following substantial completion.

1. Warranty Period: Commercial lighting dimmers and switches, sensors, keypads, lighting enclosures, terminal blocks, power supplies, thermostats, and control processors, when dedicated for use as part of a commercial lighting control system: 5 year warranty

2. Manufacturer's Extended Support Service: Extended telephone support: Unlimited period.

PART 2 PRODUCTS

2.1 Manufacturers

A. MANUFACTURERS: Subject to compliance with requirements, provide products by one of the following Manufacturers:

1. Crestron Electronics INC.
2. Leviton Manufacturing Co., Inc
3. Legrand Wattstopper

B. Substitutions:

1. All substitutions must be submitted in writing to the Engineer of Record within [14] days prior to bid date.

2. Proposed substitutions must be documented with a compliance review.

2.2 General

A. Contractor shall provide system hardware that is manufactured and warranted by a single manufacturer.

B. Provide control system with compatibility for BACNET/IP.

C. System shall provide time clock functionality as well as support for multiple interface devices.

D. System must automatically adjust for daylight savings time and leap year.

2.3 ZUM Wired Dimming Solutions

A. Load Controllers

1. ZUMNET-Junction Box Zone Controllers
    a. Junction box mounted using ½" knockout.
    b. 120/277 VAC input
    c. Real-time Power monitoring
    d. Connections
        1) ZUMLINK RJ45 ports x 2 (Cresnet)
        2) ZUMNET RJ45 ports x 2 (Ethernet)
        3) Occ Sensor Input (24V, G, OCC)
        4) Photo Sensor Input (24V, G, PHO)
        5) Override Input (OVR, G)
        6) Integrated Ethernet Switch allowing daisy chaining (up to 20 devices)
    e. Products:
        1) CRESTRON ZUMNET-JBOX-16A-LV (16A, 0-10V)
        2) CRESTRON ZUMNET-JBOX-16A-DALI (16A, 1 DALI LOOP)
2. ZUMLINK-Junction Box Zone Controllers
    a. Junction box mounted using ½" knockout.
    b. 120/277 VAC input
    c. Real-time Power monitoring
    d. Connections
        1) ZUMLINK RJ45 ports x 2 (Cresnet)
        2) Occ Sensor Input (24V, G, OCC)
        3) Photo Sensor Input (24V, G, PHO)
        4) Override Input (OVR, G)
    e. Products:
        1) CRESTRON ZUMLINK-JBOX-16A-LV (16A, 0-10V)
        2) CRESTRON ZUMLINK-JBOX-20A-SW (20A, SWITCHED)
        3) CRESTRON ZUMLINK-JBOX-20A-PLUG (20A, SWITCHED PLUG LOAD)
        4) CRESTRON ZUMLINK-JBOX-DIMU. (5A UNIVERSAL PHASE DIMMING)
3. Economy ZUMLINK-Junction Box Zone Controllers
    a. Junction box mounted using ½" knockout.
    b. 120/277 VAC input

c. Real-time Power monitoring

d. Connections

1) ZUMLINK RJ45 ports x 2 (Cresnet)

e. Products:

1) CRESTRON ZUMLINK-JBOX-16A-LV-ECON (16A, 0-10V)

4. Emergency ZUMLINK-Junction Box Zone Controllers

a. Junction box mounted using ½" knockout.

b. 120/277 VAC input

c. Real-time Power monitoring

d. UL-924 Certified

e. Connections

1) ZUMLINK RJ45 ports x 2 (Cresnet)

2) Occ Sensor Input (24V, G, OCC)

3) Photo Sensor Input (24V, G, PHO)

4) Override Input (OVR, G)

f. Products:

1) CRESTRON ZUMLINK-JBOX-16A-LV-EM (16A, 0-10V)

B. User Interfaces

1. ZUMLINK-keypads

a. Field configurable remote keypad, engravable programmable buttons in number indicated, with Single Green LED indicator, configured to fit in standard single-gang box.

b. Trimmed using decorator style faceplate (not included) or Crestron decorator-style faceplates (FP-G series)

c. RJ45 connection for power and communication (2 x RJ45 ZUMLINK ports facing up)

d. Bluetooth connectivity

e. Colors White, Gray, Black, Red

f. Minimum Buttons: 2, Maximum Buttons:8. (engraving options available)

1) Button kits required

a) ZUMLINK-BTNR
b) ZUMLINK-BTN2
c) ZUMLINK-BTN4
d) ZUMLINK-BTN6
e) ZUMLINK-BTN8

g. Color shall be White

h. Mounting: Mounts in a 1-gang or larger electrical box or mud ring

i. Products

1) ZUMLINK-KP-R

2. ZUMLINK-ZAP

a. Wireless Access Point for ZUMMESH system integration

b. Mounting: Mounts in a 1-gang box.

c. RJ45 connection for power and communication (2 x RJ45 ZUMLINK ports)

d. Supports integration of ZUMMESH wireless communication products using a Wi-Fi friendly 2.4 GHz peer-to-peer mesh network topology.

e. Supports integration of 6 zummesh battery devices and 20 AC powered devices

f. Product: ZUMLINK-ZAP

3. ZUMLINK-AI

a. Control Port Expansion Module

1) 4 x Contact Closure Inputs

2) 2 x Contact Closure Outputs

3) Bi-directional RS232 for room control

b. RJ45 ZUMLINK connection for power and communication (2 x RJ45 ZUMLINK ports)

c. Product: ZUMLINK-AI

4. ZUMLINK-PART

a. Partition Sensor Integration Module

b. Accepts signal from GLS-PART-CN Partition Sensor

c. RJ45 connection for power and communication (4 x RJ45 ZUMLINK ports)

d. Product: ZUMLINK-PART

C. Motion Sensors

1. Product: ZUMLINK-DT-QUATTRO-DLS [RLY]

a. Characteristics

1) Sensing Technology: Passive infrared (PIR), single pyro, 11 detection levels, 520 switching zones, ultrasonic 40 kHz.

2) Mounts to a 4" octagon box.

3) Time Delay Setting

4) Light Level Setting: 1 - 100 fc (10 - 1000 lux)

5) Dip Switch Settings

6) HVAC dry contacts: (COM2 Version only)

7) Test Mode: Dip switch setting or programming remote

8) Ultrasonic Coverage at 9 feet (2.7 m):

a) Presence: Maximum 20 feet by 20 feet (6 by 6 m) or 400 sf (36 sm).
b) Radially and Tangentially: Maximum 32 feet by 32 feet (10 by 10 m) or 1,000 sf (100 sm).

9) PIR Detection Zones:

a) Presence: Maximum 10 feet by 10 feet (3 by 3 m) or 100 sf (9 sm).
b) Radially: Maximum 13 feet by 13 feet (4 by 4 m).
c) Tangentially: Maximum 26 feet by 26 feet (8 by 8 m).

D. PIR Motion Sensors

1. Product: ZUMLINK-IR-QUATTRO-DLS [RLY]

a. Characteristics

1) Sensing Technology: Passive infrared (PIR)

2) Mounts to a 4" octagon box.

3) Delay Setting

4) Light Level Setting: 1 - 100 fc (10 - 1000 lux)

5) Dip Switch Settings

6) HVAC dry contacts: (RLY Version Only)

7) Test Mode: Dip switch setting or programming remote

8) Coverage at 9 feet (2.7 m): 360 deg square mechanically scalable detection zones.

a) Presence: Maximum 15 feet by 15 feet (4.7 by 4.7 m) or 225 sf (21.2 sm).
b) Radially: Maximum 15 feet by 15 feet (4.7 by 4.7 m) or 225 sf (21.2 sm).
c) Tangentially: Maximum 23 feet by 23 feet (7 by 7 m) or 529 sf (50.4 sm).

2. Product: ZUMLINK-IR-QUATTRO-HD-DLS [RLY]

a. Characteristics

1) Sensing Technology: Passive infrared (PIR)

2) Mounts to a 4" octagon box.

3) Delay Setting

4) Light Level Setting: 1 - 100 fc (10 - 1000 lux)

5) Dip Switch Settings

6) HVAC dry contacts: (RLY Version Only)

7) Test Mode: Dip switch setting or programming remote

8) Coverage at 9 feet (2.7 m): 360 deg square mechanically scalable detection zones.

a) Presence: Maximum 25.5 feet by 25.5 feet (7.9 by 7.9 m) or 650.25 sf (62.4 sm).
b) Radially: Maximum 25.5 feet by 25.5 feet (7.9 by 7.9 m) or 650.25 sf (62.4 sm).
c) Tangentially: Maximum 65.5 feet by 65.5 feet (20 by 20 m) or 4,290.25 sf (400 sm).

E. Ultra-Sonic Motion Sensors

1. Product: ZUMLINK-US-QUATTRO-DLS [RLY]

a. Characteristics

1) Sensing Technology: Ultrasonic

2) Mounts to a 4" octagon box.

3) Delay Setting

4) Light Level Setting: 1 - 100 fc (10 - 1000 lux)

5) Dip Switch Settings

6) HVAC dry contacts: (RLY Version only)

7) Test Mode: Dip switch setting or programming remote

8) Coverage at 9 feet (2.7 m):

9) Presence: Maximum 20 feet by 20 feet (6 by 6 m) or 400 sf (36 sm).

10) Radially and Tangentially: Maximum 32 feet by 32 feet (10 by 10 m) or 1,000 sf (100 sm).

2. Product: ZUMLINK-US-HALLWAY-DLS [RLY]

a. Characteristics

1) Sensing Technology: Ultrasonic

2) Mounts to a 4" octagon box.

3) Delay Setting

4) Light Level Setting: 1 - 100 fc (10 - 1000 lux)

5) Dip Switch Settings

6) HVAC dry contacts: (RLY Version only)

7) Test Mode: Dip switch setting or programming remote

8) Coverage at 9 feet (2.7 m): Maximum 6.5 feet by 65 feet (2 by 20 m) or 422.5 sf (40 sm).

3. Product: ZUMLINK-US-ONEWAY-DLS [RLY]

a. Characteristics

1) Sensing Technology: Ultrasonic

2) Mounts to a 4" octagon box.

3) Delay Setting

4) Light Level Setting: 1 - 100 fc (10 - 1000 lux)

5) Dip Switch Settings

6) HVAC dry contacts: (RLY Version only)

7) Test Mode: Dip switch setting or programming remote

8) Coverage at 9 feet (2.7 m): Maximum 6.5 feet by 33 feet (2 by 10 m) or 214.5 sf (20 sm).

F. Networking the wired Spaces

1. Zumwired spaces shall be networked together to enable time clock, load shedding and global management features.

2. The space shall be networked using a ZUMNET RJ45 ports (Ethernet)

3. Networking the space shall incorporate BMS integration as specified hereto after.

G. Devices

1. Processor

a. 4-Series control system with 2 GB SDRAM and 8 GB flash memory

b. Embedded 4-Series multicore CPU processor

c. iPhone®, iPad®, and Android™ device control app support

d. XPanel computer and web-based control

e. Modular programming architecture

f. Onboard IR/serial, COM, I/O, relay, Cresnet® network, and high-speed gigabit Ethernet control ports

g. Control subnet port providing a dedicated local network for Crestron® devices

h. High-speed USB 2.0 host port and rear panel memory card slot

i. Crestron Fusion® software room monitoring and scheduling support

j. Crestron XiO Cloud™ service provisioning and management support

k. Enterprise-class network security and authentication

l. SNMP V3 remote IT management support

m. Native BACnet network/IP support

n. Installer setup via software, web browser, or cloud

o. IPv6 ready

p. Integrates with Apple® HomeKit® technology

q. 1 rack unit mounted

r. Product: ZUM-HUB4

2.4 ZUM Wireless Dimming Solutions

A. Wireless technology shall be fully compatible and scalable with all manufacturer lighting control solutions

B. All batteries shall be field replaceable with non-proprietary standard sizes

C. Wireless device characteristics

1. Lighting control devices shall communicate using a Wi-Fi friendly 2.4 GHz peer-to-peer mesh network topology.

2. Devices shall be commissionable as an autonomous control system without the need for additional equipment.

3. Each device shall auto negotiate its RF channel to avoid noisy commercial environments.

4. Shall be secured using 128-bit encryption.

5. Up to 32 devices can make up a space.

6. The range within wireless devices shall be 50'.

D. Devices

1. Junction Box Zone Controllers

a. ZUMMESH Wireless Communication.

b. Junction box mounted using ½" knockout.

c. 120/277 VAC input

d. Products:

1) Crestron ZUMMESH-JBOX-16A-SW (16A, SWITCHED)

2) CRESTRON ZUMMESH-JBOX-5A-LV (5A, 0-10V)

3) CRESTRON ZUMMESH-JBOX-16A-LV (16A, 0-10V)

4) CRESTRON ZUMMESH-JBOX-20A-PLUG (20A, SWITCHED PLUG LOAD)

5) CRESTRON ZUMMESH-JBOX-DALI-1. (1 DALI LOOP)

6) CRESTRON ZUMMESH-EXP-JBOX-16A-DIMU. (16A UNIVERSAL PHASE DIMMING)

2. Emergency Junction Box Zone Controllers

a. ZUMMESH Wireless Communication.

b. Junction box mounted using ½" knockout.

c. 120/277 VAC input

d. UL-924 Certified

e. Products:
    1) CRESTRON ZUMMESH-JBOX-16A-LV-EM (16A, 0-10V)

3. Wall Box Zone Controllers
    a. ZUMMESH Wireless Communication
    b. Trimmed using gangable decorator trim plates
    c. Mounted in 3.5" back box.
    d. Color shall be white [black] [Almond]
    e. Products:
        1) Crestron ZUMMESH-5A-SW-W-[B][A] - S (switched load, 5A)
        2) Crestron ZUMMESH-5A-LV-W-[B][A] - (0-10v dimmed load, 5 amps)
        3) Crestron ZUMMESH-DIM-W-[B][A] - (forward phase load, 4 amps)
        4) Crestron ZUMMESH-DELV-W-[B][A] - (reverse phase load, 4 amps)
4. Keypads (Battery Powered)
    a. ZUMMESH wireless communication
    b. Electrical Box, wall, or glass mount
    c. Trimmed using gangable decorator trim plates
    d. Replaceable coin cell battery (5-year life)
    e. Color shall be white [black] [Almond]
    f. 1 Button (rocker with ON/OFF/DIM UP/DIM DOWN features)
        1) Product: Crestron ZUMMESH-KP10ABATT-W [B][A]-S
    g. 4 Button (ON/SCENE 1/SCENE 2/OFF)
        1) Product: Crestron ZUMMESH-KP10BBATT-W-[B][A]-S
    h. 6 Button (ON/SCENE 1/SCENE 2/OFF/DIM UP/DIM DOWN)
        1) Product: Crestron ZUMMESH-KP10CBATT-W-[B][A]-S
    i. 6 Button (ON/SCENE 1/SENSOR DISABLE/OFF/DIM UP/ DIM DOWN)
        1) Sensor Disable – Lights will not turn off automatically for 2 hours.
        2) Product: Crestron ZUMMESH-KP10DBATT-W-[B][A]-S
5. Keypads (AC Powered)
    a. ZUMMESH wireless communication
    b. Electrical Box Mountable
    c. Trimmed using gangable decorator trim plates
    d. 120/277 VAC input
    e. Color shall be white [Black][Almond]
    f. 1 Button (Rocker with ON/OFF/DIM UP/DIM DOWN features)
        1) Product: Crestron ZUMMMESH-KP10A-W-[B][A]-S
    g. 4 Button (ON/SCENE 1/SCENE 2/OFF)
        1) Product: Crestron ZUMMESH-KP10B-W-[B][A]-S
6. Dual Loop daylight sensors
    a. ZUMMESH wireless communication

b. Uses open and closed loop technologies for auto calibration

c. Open loop sensing technology for daily sensing

d. Replaceable (2) lithium-ion AAA batteries (10-yr life)

e. Product: Crestron ZUMMESH-PHOTOCELL-BATT

7. Motion Sensors

a. ZUMMESH wireless communication

b. Passive infrared sensing technology

c. Ceiling Mounted

d. 500 SQFT. Coverage (8-12 ft. ceilings)

e. Grace Occupancy – When lights turn off due to vacancy, a 15-second grace period starts during which the room lights can be turned on again by waving a hand to trigger the sensors.

f. Vacancy sensors shall go to occupancy mode when keypad low battery detected.

g. Replaceable lithium-ion 9V battery (10-Year life)

h. Products:

1) Crestron ZUMMESH-PIR-OCCUPANCY-BATT (auto on, auto off)

2) Crestron ZUMMESH-PIR-VACANCY-BATT (manual on, auto off)

8. Partition Sensor

a. ZUMMESH wireless communication

b. 24 VDC Input

c. Sensor Technology: Diffuse reflective

d. Light Source: Pulse modulated infrared LED

e. Mounts in a 1-gang US electrical box

a. Product: ZUMMESH-PART

9. Sensor Interface Device

a. ZUMMESH wireless communication

b. Junction box mounted using ½" knockout

c. 120/277 VAC Input

d. Supplies 24 VDC, 250MA to connected sensors wired in parallel

e. Product: ZUMMESH-JBOX-SIM

E. Networking the Wireless Spaces

1. Wireless spaces shall be networked together to enable time clock, load shedding and global management features.

2. The space shall be networked using a Wi-Fi friendly 2.4 GHz mesh network topology.

3. The range between the wireless devices shall be no more than 150'

4. The wireless technology shall be Crestron zūm Net.

5. Networking the space shall incorporate BMS integration as specified hereto after.

6. Wireless solutions shall be fully compatible with all other lighting control solutions specified herein.

F. Devices

1. Wireless Bridge

a. Each space shall have minimum one wireless bridge that links the space with the network connection.

b. Wireless bridge shall enable IOS or Android app to configure space using Bluetooth technology.

c. Crestron Zūm wireless bridge shall have communication with up to 32 MESH devices.

d. Product: ZUMMESH-NETBRIDGE

2. Wireless Gateway

a. Crestron Zūm NET gateway shall have bi-directional MESH communication with up to 50 ZUMMESH-NETBRIDGE devices.

b. Powered via IEEE 802.3 at Type 1.

c. Product: Crestron ZUMNET-GATEWAY

3. Floor Hub

a. Connects up to 1000 Crestron ZUMMESH-NETBRIDGE devices.

b. Contains astronomical time clock.

c. Maintenance is performed via standard web browser.

d. 1 rack unit mounted

e. Product: Crestron ZUM-FLOOR-HUB

2.5 Wired Load Controllers

A. Product Family: Crestron Spacebuilder GLPP

1. Characteristics:

a. Provide 1, 2, or 3 zone lighting controllers for 0-10v zones.

b. Shall operate as an autonomous lighting controller for the space.

c. All sensors and zones within the space shall be controlled without additional equipment.

d. Lighting controller shall be surface-mounted. Industrial control enclosure mounts directly on two side by side 4" square electrical junction boxes, suitable for concealed locations.

e. Circuit Input: 100 – 277 VAC, 50/60 Hz. Input, one 16 amp.

f. [Lighting controller shall be networked as part of the building wide lighting control system using Cresnet communication]

3. Zone Outputs

g. 1,2, or 3 high inrush mechanically held relays for switching loads.

h. 1,000,000 cycle mechanically latching relays

i. Zero-cross arc-less high inrush

j. Air gap off protection on each channel

k. 0-10v dimming models shall include 0-10v 4 wire dimming for each channel.

2. Products

a. Crestron GLPP-SWCN (1 Zone Switching)

b. Crestron GLPP-1SW2CN (2 Zone switching)

c. Crestron GLPP-1SW3CN (3 Zone switching)

d. Crestron GLPP-DIMFLVCN-PM (1 ZONE 0-10v with Power Monitoring)

e. Crestron GLPP-1DIMFLV2CN-PM (2 ZONE 0-10v with Power Monitoring)

f. Crestron GLPP-1DIMFLV3CN-PM (3 ZONE 0-10v with Power Monitoring)

B. Product Family: Crestron GLPAC

1. Characteristics

a. Provide 4 or 8 zone lighting controller for switching or 0-10v zones.

b. Unit shall operate as an autonomous lighting controller for the space.

c. Up to 4 occupancy sensors and photocells per space

d. Up to 10 devices can connect without additional power

e. [Lighting controller shall be networked as part of the building wide lighting control system using ethernet communication]

f. Lighting controller shall be a surface mounted NEMA 1 industrial control enclosure, suitable for concealed locations.

2. Zone Outputs

a. 4 or 8 circuit inputs

b. 100 – 277 VAC, 50/60 HZ. 16amps each.

c. [Barriered 4 normal and 4 emergency relays (-4E models only)]

d. 4 or 8 zone outputs

e. 100,000 cycle mechanically latching relays

f. Air gap off protection on each channel.

g. 0-10v 4-wire dimming for each channel (60mA max current sink)

h. Override port for UL924 life safety applications

i. [Real time power monitoring on all channels (-PM models only)]

j. [4 normally open isolated relays (-PM models only)]

k. [Chicago Plenum rated enclosure (-CP models only)]

3. Products

a. Crestron GLPAC-DIMFLV4 [-CP] [-PM] (4-CH controller)

b. Crestron GLPAC-DIMFLV8 [-CP] [-PM] (8-CH controller)

c. Crestron GLPAC-DIMFLV8-4E [-CP] [-PM] (4-ch NORMAL & 4-ch emergency controller)

Product Family: Crestron GL-IPAC

4. Characteristics

   a. Provide 8 zone lighting controller for switching

   b. Unit shall operate as an autonomous lighting controller for the space.

   c. Up to 4 occupancy sensors and photocells per space

   d. Up to 15 devices can connect without additional power

   e. [Lighting controller shall be networked as part of the building wide lighting control system using ethernet communication]

   f. Lighting controller shall be a surface mounted NEMA 1 industrial control enclosure, suitable for concealed locations.

5. Zone Outputs

   a. 8 circuit inputs

   b. 100 – 277 VAC, 50/60 HZ. 16amps each.

   c. 8 zone outputs

   d. 100,000 cycle mechanically latching relays

   e. Air gap off protection on each channel.

   f. Override port for UL924 life safety applications

6. Products

   a. Crestron GL-IPAC-SW8

C. Product Family: CAEN, CAEN MLO

1. Characteristics

   a. Panel shall be digitally addressable using serial or Ethernet communication from Control Processor Panel specified here to after.

   b. Lighting dimmers shall be compatible with drivers / ballasts and LEDs / lamps as listed in SS26 50 00 LIGHTING.

   c. Dimmers shall be provided in quantities, control types, and rated for the connected load as shown on the Contract Drawings.

   d. Line and load phases shall be coordinated per manufacturers recommendations.

   e. Dimming modules shall be field replaceable.

   f. Dimming panels shall be listed to UL508.

   g. Emergency Override: Remote override capability.

   h. Microprocessor based control for time clock override and remote dimming.

   i. Lighting control panels shall comply with NEMA PB 1 and UL 50 (CAN/CSA C22.2, No. 94), UL 67 (CSA C22.2, No. 29), UL 489 (CAN/CSA C22.2, No. 65), and UL 916 (CSA C22.2, No. 205).

   j. Panel may contain Crestron 4-Series Control Processor

      1) Product: Crestron DIN-AP4

   k. Panel may contain 24V power supply

      1) Product: Crestron DIN-PWS60

   l. Panel may contain ethernet to serial converter

      1) Product: Crestron DIN-CENCN-2

2. FEED TYPES

a. Reference contract drawing schedules for required feed types and breaker ratings

b. FEED-THROUGH (FT)

1) No Branch circuit overcurrent protection.

c. Main Lug Only (MLO)

1) 120vac 3-phase; 120/240 VAC split-phase

a) 20 AMP thermal magnetic BREAKER
b) AIC rated to 10,000A
c) 20 breakers max per enclosure.

3. Control Modules

a. GL-CAEN-4HSW4-KIT

1) (4) 16A High Inrush Switching Outputs

2) Arc-less high inrush, lifetime rated minimum 1,000,000 on/off cycles, with air gap off protection.

3) 120V AC, 50/60 Hz.

4) 32 degrees to 104 degrees Fahrenheit

5) UL924 for emergency lighting control.

b. GL-CAEN-2DIMFLV8- [277]-KIT

1) (8) 4A 0-10V LED, fluorescent or switching outputs

2) [120] – [277] V, 50/60Hz.

3) 32 to 104 degrees Fahrenheit

4) UL924 for emergency lighting control.

c. GL-CAEN-2DIMU8- [277]-KIT

1) (8) 4A Forward, Reverse Phase or switching outputs

2) [120] – [277] V, 50/60Hz.

3) 32 to 104 degrees Fahrenheit

4) UL924 for emergency lighting control.

d. CLX-1DIMU4-HP

1) (4) Forward, Reverse Phase or switching outputs.

2) Up to 16A total, 10A Max per output.

3) 120 V, 50/60Hz.

4) 32 to 104 degrees Fahrenheit.

5) UL924 for emergency lighting control.

e. GL-CAEN-2DIM8-[277]-KIT

1) (8) 4A Forward, Reverse Phase or switching outputs

2) [120] – [277] V, 50/60Hz.

3) 32 to 104 degrees Fahrenheit

4) UL924 for emergency lighting control.

f. CLX-1FAN4

1) 4 Fan Control Channels

2) 2 Amps Per Channel

3) Module Total 8 Amps
4) Load Types Ceiling Fan Motors
5) 32 to 104 degrees Fahrenheit
6) 120 Volts AC, 50/60Hz, single-phase

4. Enclosures CAEN-FT
   a. CAEN-2x1
      1) 16AWG Galvanized steel backbox
      2) Height: 23.50 in (596.9 mm)
      3) Width: 14.38 in (365.1 mm)
      4) Depth: 4.00 in (101.6 mm)
      5) 120-277 VAC.
   b. CAEN-4x1
      1) 16AWG Galvanized steel backbox
      2) Height: 38.25 in (971.6 mm)
      3) Width: 14.38 in (365.1 mm)
      4) Depth: 4.00 in (101.6 mm)
      5) 120-277 VAC.
   c. CAEN-7x1
      1) 16AWG Galvanized steel backbox
      2) Height: 62.00 in (1574.8 mm)
      3) Width: 14.38 in (365.1 mm)
      4) Depth: 4.00 in (101.6 mm)
      5) 120-277 VAC.
   d. CAEN-4x2
      1) 16AWG Galvanized steel backbox
      2) Height: 38.25 in (971.6 mm)
      3) Width: 25.50 in (647.7 mm)
      4) Depth: 4.00 in (101.6 mm)
      5) 120-277 VAC.
   e. CAEN-7x2
      1) 16AWG Galvanized steel backbox
      2) Height: 62.00 in (1574.8 mm)
      3) Width: 25.50 in (647.7 mm)
      4) Depth: 4.00 in (101,6 mm)
      5) 120-277 VAC.
5. Enclosures CAEN-MLO
   a. CAEN-3x1-MLO-120/3P
      1) 16AWG Galvanized steel backbox
      2) Height: 39.65 in (1008 mm);
      3) Width: 16.10 in (409 mm);

4) Depth: 4.98 in (127 mm)

5) 120/208 AC, 225 Amps MAX.

b. CAEN-5x1-MLO-120/3P

1) 16AWG Galvanized steel backbox

2) Height: 62.75 in (1594 mm);

3) Width: 16.10 in (409 mm);

4) Depth: 4.98 in (127 mm)

5) 120/208 AC, 225 Amps MAX.

c. CAEN-5x2-MLO-120/3P

1) 16AWG Galvanized steel backbox

2) Height: 62.75 in (1594 mm);

3) Width: 27.25 in (693 mm);

4) Depth: 4.98 in (127 mm)

5) 120/208 AC, 225 Amps MAX.

D. Product Family: GLEX-FT, GLEP-MLO

1. Characteristics: GLEX-FT

a. Panel shall be digitally addressable using serial or Ethernet communication from Control Processor Panel specified here to after.

b. Lighting dimmers shall be compatible with drivers / ballasts and LEDs / lamps as listed in SS26 50 00 LIGHTING.

c. Dimmers shall be provided in quantities, control types, and rated for the connected load as shown on the Contract Drawings.

d. Line and load phases shall be coordinated per manufacturers recommendations.

e. Dimming modules shall be field replaceable.

f. Dimming panels shall be listed to UL508.

g. Dimming panels shall be listed to UL924.

h. Emergency Override: Remote override capability.

i. Microprocessor based control for time clock override and remote dimming.

j. Lighting control panels shall comply with NEMA PB 1 and UL 50 (CAN/CSA C22.2, No. 94), UL 67 (CSA C22.2, No. 29), UL 489 (CAN/CSA C22.2, No. 65), and UL 916 (CSA C22.2, No. 205).

k. No Branch circuit overcurrent protection.

l. All SpaceBuilder panels will be UL508 factory assembled.

m. Panels may contain 4-series control processor.

1) Product: Crestron DIN-AP4

n. Panel may contain 24V power supply

1) Product: Crestron DIN-PWS60

o. Panel may contain ethernet to serial converter

1) Product: Crestron DIN-CENCN-2

2. Control Modules

a. GLXP-DIMFLV8-LP

1) (8) 16A 0-10V LED, fluorescent or switching outputs.

2) Arc-less high inrush, lifetime rated minimum 1,000,000 on/off cycles, with air gap off protection.

3) 120-277 VAC, 50/60 Hz.

4) 32 degrees to 104 degrees Fahrenheit

5) UL924 for emergency lighting control.

b. GLXP-SW16-LP

1) (16) 16A switching outputs

2) 120-277 VAC, 50/60 Hz.

3) 32 to 104 degrees Fahrenheit

4) UL924 for emergency lighting control.

5) 500,000 on/off cycles

c. GLXP-HSW12-LP

1) (12) 16A High-Inrush switching outputs.

2) 120-277 VAC, 50/60 Hz.

3) 32 to 104 degrees Fahrenheit

4) Arc-less high inrush, lifetime rated minimum 1,000,000 on/off cycles, with air gap off protection.

5) UL924 for emergency lighting control.

d. GLXX-2DIM8

1) (8) (4A) Forward Phase, 2-wire or switching outputs.

2) 4 channels of 3-wire fluorescent dimming.

3) 120 – 277 VAC, 50/60Hz.

4) 32 to 104 degrees Fahrenheit.

e. GLXX-HDSW8

1) Up to 8 channels of heavy duty modular relays

a) Relays: GLR-HD-1P and GLR-HD-2P
b) Supports 120, 230, 277 & 347 Volt applications

2) Requires 24 Volts DC, delivered via 16 pin GLXX-CTRL

f. GLXX-HDSW16

1) Up to 8 channels of heavy duty modular relays

a) Relays: GLR-HD-1P and GLR-HD-2P
b) Supports 120, 230, 277 & 347 Volt applications

2) Requires 24 Volts DC, delivered via 16 pin GLXX-CTRL

3. Enclosures GLEX-FT

a. GLEX-FT-24

1) 16AWG Galvanized steel backbox. Surface Mount.

2) Height: 124.25 in (616 mm)

3) Width: 16.13 in (409 mm)

4) Depth: 4.44 in (113 mm)

5) 120-277 VAC.

b. GLEX-FT-56

1) 16AWG Galvanized steel backbox
2) Height: 39.66 in (1007 mm)
3) Width: 16.13 in (409 mm)
4) Depth: 4.44 in (113 mm)
5) 120-277 VAC.

c. GLEX-FT-84-HC
1) 16AWG Galvanized steel backbox
2) Height: 63 in (1600.2 mm)
3) Width: 15.25 in (387.35mm)
4) Depth: 4.5 in (114.3 mm)
5) 120-277 VAC.

4. Enclosures GLEP-MLO
a. GLEP-277-30
1) 16AWG Galvanized steel backbox
2) Height: 70 in (1778 mm)
3) Width: 20.25 in (514 mm)
4) Depth: 6.63 in (168 mm)
5) 30 Zone cabinet @ 277V VAC

b. GLEP-120-30
1) 16AWG Galvanized steel backbox
2) Height: 70 in (1778 mm)
3) Width: 20.25 in (514 mm)
4) Depth: 6.63 in (168 mm)
5) 30 Zone cabinet @ 120V VAC

c. GLEP-277-42
1) 16AWG Galvanized steel backbox
2) Height: 78 15/16 in (2005 mm)
3) Width: 20.25 in (514 mm)
4) Depth: 6.63 in (168 mm)
5) 42 Zone cabinet @ 277V VAC

d. GLEP-120-42
1) 16AWG Galvanized steel backbox
2) Height: 78.93 in (2005 mm)
3) Width: 20.25 in (514 mm)
4) Depth: 6.63 in (168 mm)
5) 42 Zone cabinet @ 120V VAC

e. Branch Circuit Breakers
1) 120V/10K AIC
a) 120 VAC 20 AMP
b) Product: GLE/GLEPB-120-20A-10K

2) 120V/22K AIC

a) 120 VAC 20 AMP
b) Product: GLE/GLEPB-120-20A-22K

3) 120V/65K AIC

a) 120 VAC 20 AMP
b) Product: GLE/GLEPB-120-20A-65K

4) 277V/18K AIC

a) 277 VAC 20 AMP
b) Product: GLE/GLEPB-277-20A-18K

5) 277V/35K AIC

a) 277 VAC 20 AMP
b) Product: GLE/GLEPB-277-20A-35K

6) 277V/65K AIC

a) 277 VAC 20 AMP
b) Product: GLE/GLEPB-277-20A-65K

E. Product Family: DIN

1. Characteristics

a. Panel shall be digitally addressable using serial or Ethernet communication from Control Processor Panel specified here to after.

b. Lighting dimmers shall be compatible with drivers / ballasts and LEDs / lamps as listed in SS26 50 00 LIGHTING.

c. Dimmers shall be provided in quantities, control types, and rated for the connected load as shown on the Contract Drawings.

d. Dimming modules shall be field replaceable.

e. Dimming panels shall be listed to UL508.

f. Dimming panels shall be listed to UL924.

g. Emergency Override: Remote override capability.

h. Microprocessor based control for time clock override and remote dimming.

i. Lighting control panels shall comply with NEMA PB 1 and UL 50 (CAN/CSA C22.2, No. 94), UL 67 (CSA C22.2, No. 29), UL 489 (CAN/CSA C22.2, No. 65), and UL 916 (CSA C22.2, No. 205).

j. Panel may contain 4-series control processor.

1) Product: Crestron DIN-AP4

k. Panel may contain 24V power supply

1) Product: Crestron DIN-PWS60

l. Panel may contain serial hub capable of 3 subnets

1) Product: Crestron DIN-HUB

m. Panel may contain ethernet to serial converter

1) Product: Crestron DIN-CENCN-2

n. Cabinet may contain POE Switch

1) Product: CEN-SW-POE-5

F. Enclosures

1. Enclosure Family: DIN-EN
    a. DIN-EN-2X18
        1) 16AWG Galvanized steel backbox
        2) Height: 12.32 in (323 mm)
        3) Width: 14.13 in (359 mm)
        4) Depth: 4.38 in (111 mm)
        5) 120-277 VAC.
        6) DIN Rail Detail: (2) 342 mm x 35 mm rails
    b. DIN-EN-3X18
        1) 16AWG Galvanized steel backbox
        2) Height: 23.50 in (597 mm)
        3) Width: 14.38 in (366 mm)
        4) Depth: 4.44 in (113 mm)
        5) 120-277 VAC.
        6) DIN Rail Detail: (3) 342 mm x 35 mm rails
    c. DIN-EN-6X18
        1) 16AWG Galvanized steel backbox
        2) Height: 38.88 in (989 mm)
        3) Width: 14.38 in (366 mm)
        4) Depth: 4.44 in (113 mm)
        5) 120-277 VAC.
        6) DIN Rail Detail: (6) 342 mm x 35 mm rails
    d. GLEX-FT-84-HC
        1) 16AWG Galvanized steel backbox
        2) Height: 63 in (1600.2 mm)
        3) Width: 15.25 in (387.35mm)
        4) Depth: 4.5 in (114.3 mm)
        5) 120-277 VAC.
        6) DIN Rail Detail: (10) 342 mm x 35 mm rails
2. Control Modules
    a. DIN-DALI-2

        1) Din-rail mount Module shall contain 2 channels of digital DALI loop containing 64 devices per channel.

        2) Sensors and user interfaces shall not reside on the DALI bus. These accessories shall be networked to the DALI interface controller as part of the turnkey solution. Reference specifications hereto after for more details on sensor and user interface selections that shall be compatible with the turnkey DALI solution.

        3) The DALI bus shall be class 2 (1) twisted pair #18 AWG or larger and be shielded. Install in free air per DIV 26.

        4) Module shall contain an override input to allow an external contact closure to override the control system program and force each device to its "System failure level"

5) Module shall contain an internal power supply

6) 32 to 104 degrees Fahrenheit operating temperature

7) DIN-DALI-2 module is utilized in GL-DALI spacebuilder

b. DIN-DMX- [1][2] UNIVERSE

1) DIN-rail mountable module shall contain [1] or [2] universe of DMX control.

2) Controller shall allow individually controllable and independently running timelines and scenes.

3) Controller shall be scalable allowing multiple units to connect via ethernet.

4) Programmed and configured using proprietary system software.

5) Shall support RDM, SACN, and ART-NET.

6) DIN-DMX module is utilized in GL-DMX spacebuilder

c. GLA-ISP-4R-RJ45A

1) DIN-rail mountable module shall contain 4 optically isolated DMX outputs

2) Shall support RDM, SACN, and ART-NET.

3) Terminations utilize convenient RJ45 568B connections

d. DIN-AO8

1) Eight 0-10V analog output control ports

2) Interface for 3rd-party lighting and heating/cooling

3) Fully programmable functionality via DIN-AP2

4) Setup via front panel or software

5) Override input

6) Cresnet communications

7) 6M wide DIN rail mounting

e. DIN-IO8

1) 8 Versiport I/O ports

2) Interface for 3rd-party sensors, detectors, contact closures, and alarms

3) Fully programmable functionality via DIN-AP2

4) Cresnet communications

5) 6M wide DIN rail mounting.

f. DIN-4DIMFLV4

1) Provides 4 channels of 0-10 Volt dimming control

2) Supports 120 and 220 to 240 Volt, 50/60 Hz applications

3) Allows switching of lighting and exhaust fans[1]

4) Includes an override input

5) Communicates using Cresnet®

6) Sets up via the front panel or through software

7) Offers programmable functionality via DIN-AP4

8) Mounts on a 9M wide DIN rail

9) CEC Title 24 2013 Compliant

g. DIN-1DIM4

1) 4 channels of dimming
2) 120 to 277 Volt 50/60 Hz operation
3) Selectable non-dim mode
4) Master air-gap relay
5) Override input
6) Cresnet® communications
7) Setup via front panel or software
8) Programmable functionality via DIN-AP4
9) 12M wide DIN rail mounting
10) CEC Title 24 2013 Compliant

h. DIN-1DIMU4
1) 4 channels of forward or reverse phase dimming
2) Auto load detection
3) 120 to 240 Volt 50/60 Hz operation
4) Selectable non-dim mode
5) Extreme stability in noisy environments
6) Short circuit and overload protection
7) Master air-gap relay
8) Override input
9) Cresnet® communications
10) Setup via front panel or software
11) Programmable functionality via DIN-AP4
12) 12M wide DIN rail mounting
13) CEC Title 24 2013 Compliant

i. DIN-8SW8-I
1) 8 channels of power switching
2) 8 voltage-driven isolated digital inputs
3) Support for 120 to 240 Volt 50/60 Hz lighting and motor loads
4) Override input
5) Cresnet® communications
6) Setup via front panel or software
7) Programmable functionality
8) 9M wide DIN rail mounting

j. DIN-SACN-DMX
1) Converts between DMX512A and sACN, Art-Net, or ESP protocols
2) Enables distribution of DMX over Ethernet or Wi-Fi®
3) Enables Crestron® control of DMX lighting fixtures and systems
4) Supports a single universe Ethernet to DMX node in output mode
5) Supports a single universe DMX to Ethernet node in input mode
6) Supports broadcast or unicast (unicast in input mode only)

7) Supports HTP/LTP merging of up to 2 DMX sources (output mode only)

8) Supports RDM over Art-Net

9) Easy web browser based setup and firmware update

10) 4U 35 mm DIN rail mountable

11) PoE or 7-24 Volt DC powered (power supply not included)

2.6 USER INTERFACES

A. Product: Crestron C2N-CBD-P-W [B][A]-S

1. Provide keypad quantities and locations as specified herein and shown on the contract drawings.

2. Field configurable remote keypad with auto-adjusting backlight illuminating replaceable, engravable programmable buttons in number indicated, with white LED indicators, configured to fit in standard single-gang box.

3. Trimmed using decorator style faceplate (not included) or Crestron decorator-style faceplates (FP-G series)

4. Cresnet connected for power and communication

5. Minimum Buttons: 2, Maximum Buttons: 8.

6. Color shall be White [black][almond].

7. Mounting: Mounts in a 1-gang or larger electrical box or mud ring

B. Product: Crestron GLPPA-KP[1][2][3][4]-W [B][A]-S

1. Connects to lighting controller with class II (2) #18 AWG or greater conductors.

2. Colors shall be white [black] [almond].

3. Scene Functions

a. Rocker (ON/OFF/hold to dim) or 4 Button (ONSCENE 1/SCENE 2/OFF)

1) Product: Crestron GLPPA-KP-W [B][A]-S

4. Zone Functions

a. Rocker controlling zone 1 (ON/OFF/hold to dim)

1) Product: Crestron GLPPA-KP1-W[B][A]-S

b. Rocker controlling zone 2 (ON/OFF/hold to dim)

1) Product: Crestron GLPPA-KP2-W[B][A]-S

c. Rocker controlling zone 3 (ON/OFF/hold to dim)

1) Product: Crestron GLPPA-KP3-W[B][A]-S

d. 4 Button controlling zones 1-3 (ZONE 1 toggle/ZONE 2 toggle/ZONE 3 toggle/OFF)

1) Product: Crestron GLPPA-KP4-W[B][A]-S

C. Configuration Remote Control

1. Lighting controller shall be adjustable using the handheld battery-operated configuration remote.

2. Pre-programmed at the factory, no configuration or programming required.

3. Remote shall provide features:

a. Zone control

b. Scene setting

c. Motion sensor mode select and timeout

d. Daylight sensor calibration

4. Product: Crestron GLPPA-REMOTE-PROG

2.7 Faceplates

1. keypad devices Provide decorator faceplates for all keypad devices.
2. Multiple devices adjacent to door jams shall be ganged together.
3. Decorator faceplates shall be white [Black][Almond] and shall match in texture and color of the
4. Products:
    a. FP-G1-W [B][A]-S
    b. FP-G2-W [B][A]-S
    c. FP-G3-W [B][A]-S
    d. FP-G4-W [B][A]-S

B. Touch Screens

1. widescreen active-matrix color display
    a. TSW-1070: 1920 x 1200 WUXGA display resolution
    b. TSW-770: 1280 x 800 WXGA display resolution
    c. TSW-570: 280 x 720 HD 720 display resolution
    d. TSW-570P: 720 x 1280 HD 720 display resolution
2. Capacitive touch screen display
3. Custom-programmable virtual control buttons
4. Supports Crestron HTML5 and Smart Graphics® software custom user projects
5. Built-in Rava® SIP intercom
6. Built-in speakers and microphone
7. H.265, H.264, or MJPEG streaming video display
8. Native apps for Crestron Home™ OS, Sonos® home sound control, Zoom Rooms™ conferencing control, Microsoft Teams® online meeting solution, and various room scheduling services
9. Built-in Bluetooth® communications beacon
10. Built-in web browsing
11. Single wire Ethernet connection with PoE or PoE+ power
12. Wi-Fi® network connectivity (only available on 1070 and 770 models)
13. Dual USB 2.0 ports for room availability accessories
14. Enterprise grade security and authentication
15. Web, cloud, or device-based configuration
16. Electrical box mounting with provided mounting bracket Color: [Black] [White]. Mountable with a 1-3 gang mounting box
17. Products
    a. Crestron TSW-770-W-S (7” white, 2-gang mounted)
    b. Crestron TSW-1070-W-S (10” white, 3-gang mounted)
    c. Crestron TSW-570P-W-S (5” white, 1-gang mounted)
    d. Crestron TSW-770-B-S (7” black, 2-gang mounted)
    e. Crestron TSW-1070-B-S (10” black, 3-gang mounted)
    f. Crestron TSW-570P-B-S (5” black, 1-gang mounted)

C. XPANEL Interface: Virtual Touch Screen

1. Touch screen user interface, network-connected lighting management interface running on Crestron lighting control processor to provide lighting control, daylight harvesting, occupancy sensing, lighting schedules and overall adjustment to system functionality

2. Virtual touch screen is to be accessible via computer or laptop interface furnished by other.

3. Access to XPanel shall be via browser-based IP address or .EXE file application.

4. Product: Crestron XPANEL

D. Mobile App Interface: Virtual Touch Screen via Crestron Mobile Pro® Control App for iPhone® and Android™

1. Mobile phone application for network-connected lighting management interface configured with any Crestron 4-Series lighting control processor to provide lighting control, daylight harvesting, occupancy sensing, lighting schedules and overall adjustment to system functionality, as setup and configured by certified Crestron programmer / service provider (CSP).

2. Virtual touch screen is to be accessible via iPhone® and Android™ (furnished by others)

3. Access to a modified XPanel via application interface configuration settings.

4. Product: CRESTRON-MOBILE-PRO as provided by app store associated with iPhone® and Android™ devices.

PART 3 Sensors

3.1 Dual-Technology Motion Sensors

A. Product: Crestron GLS-ODT-C-CN

1. Characteristics

2. Detects movement within space while reducing false triggering or shutoffs while space is occupied.

3. Both technologies shall be trigged to force on, one or the other must be triggered to reset time.

4. Combination of ultrasonic motion detection and passive infrared detection with internal microprocessor.

5. Sensitivity is independently adjustable for installed conditions.

6. Delayed time off adjustment.

7. Walk-through mode.

8. Equipped with 4-wire interface for direct connection to control bus.

9. Includes connection port for remote mount photocell.

10. Coverage: 360 deg. 2000 SQFT.

11. Setup and commissioning parameters shall be configurable via handheld wireless remote.

12. Mounts to a 3” octagon box.

B. Product: Crestron GLS-ODT-C-NS

1. Characteristics

a. Detects movement within space while reducing false triggering or shutoffs while space is occupied.

b. Both technologies shall be trigged to force on, one or the other must be triggered to reset time.

c. Combination of ultrasonic motion detection and passive infrared detection with internal microprocessor.

d. Sensitivity is independently adjustable for installed conditions.

e. Delayed time off adjustment.

f. Walk-through mode.

g. Equipped with 4-wire interface for direct connection to control bus.

h. Includes connection port for remote mount photocell.

i. Coverage: 360 deg. 2000 SQFT.

j. Setup and commissioning parameters shall be configurable via handheld wireless remote.

k. Mounts to a 3" octagon box.

C. Product: Steinel GLA-DT-QUATTRO-COM1[2]-24

1. Characteristics

a. Sensing Technology: Passive infrared (PIR), single pyro, 11 detection levels, 520 switching zones, ultrasonic 40 kHz.

b. Mounts to a 4" octagon box.

c. Time Delay Setting

d. Light Level Setting: 1 - 100 fc (10 - 1000 lux)

e. Dip Switch Settings

f. HVAC dry contacts: (COM2 Version only)

g. Test Mode: Dip switch setting or programming remote

h. Ultrasonic Coverage at 9 feet (2.7 m):

1) Presence: Maximum 20 feet by 20 feet (6 by 6 m) or 400 sf (36 sm).

2) Radially and Tangentially: Maximum 32 feet by 32 feet (10 by 10 m) or 1,000 sf (100 sm).

i. PIR Detection Zones:

1) Presence: Maximum 10 feet by 10 feet (3 by 3 m) or 100 sf (9 sm).

2) Radially: Maximum 13 feet by 13 feet (4 by 4 m).

3) Tangentially: Maximum 26 feet by 26 feet (8 by 8 m).

D. Product: Steinel GLA-DT-CM-COM1[2]-24

1. Characteristics

a. Sensing Technology: Passive infrared (PIR), single pyro, 11 detection levels, 520 switching zones, ultrasonic 40 kHz

b. Mounting:

1) Direct to the wall or ceiling with anchor bolts

2) Ceiling mounted with 1/2 inch snap in chase nipple, washer and lock nut. Time Delay Setting

c. Light Level Setting: 1 - 100 fc (10 - 1000 lux)

d. Dip Switch Settings

e. HVAC dry contacts: (COM2 Version only)

f. Test Mode: Dip switch setting or programming remote

g. Ultrasonic Coverage at 9 feet (2.7 m):

1) Presence: Maximum 22 feet (7 m) or 426 sf (130 sm).

2) Radially: Maximum 38 feet (11.5 m) or 1,236 sf (376 sm).

3) Tangentially: Maximum 26 feet (8 m) or 718 sf (218 sm).

h. PIR Detection Zones:

1) Presence: Maximum 22 feet (7 m) or 440 sf (134 sm).

2) Radially: Maximum 26 feet (8 m) or 655 sf (200 sm).

3) Tangentially: Maximum 82 feet (25 m) or 5290 sf (1612 sm).

E. PIR Motion Sensors

1. Product: Steinel GLA-IR-QUATTRO-COM1[2]-24

a. Characteristics

1) Sensing Technology: Passive infrared (PIR)

2) Mounts to a 4" octagon box.

3) Delay Setting

4) Light Level Setting: 1 - 100 fc (10 - 1000 lux)

5) Dip Switch Settings

6) HVAC dry contacts: (COM2 Version only)

7) Test Mode: Dip switch setting or programming remote

8) Coverage at 9 feet (2.7 m): 360 deg square mechanically scalable detection zones.

a) Presence: Maximum 15 feet by 15 feet (4.7 by 4.7 m) or 225 sf (21.2 sm).
b) Radially: Maximum 15 feet by 15 feet (4.7 by 4.7 m) or 225 sf (21.2 sm).
c) Tangentially: Maximum 23 feet by 23 feet (7 by 7 m) or 529 sf (50.4 sm).

2. Product: Steinel GLA-IR-QUATTRO-HD-COM1[2]-24

a. Characteristics

1) Sensing Technology: Passive infrared (PIR)

2) Mounts to a 4" octagon box.

3) Delay Setting

4) Light Level Setting: 1 - 100 fc (10 - 1000 lux)

5) Dip Switch Settings

6) HVAC dry contacts: (COM2 Version only)

7) Test Mode: Dip switch setting or programming remote

8) Coverage at 9 feet (2.7 m): 360 deg square mechanically scalable detection zones.

a) Presence: Maximum 25.5 feet by 25.5 feet (7.9 by 7.9 m) or 650.25 sf (62.4 sm).
b) Radially: Maximum 25.5 feet by 25.5 feet (7.9 by 7.9 m) or 650.25 sf (62.4 sm).
c) Tangentially: Maximum 65.5 feet by 65.5 feet (20 by 20 m) or 4,290.25 sf (400 sm).

3. Product: Steinel GLA-IR-CM-COM1[2]-24

a. Characteristics

1) Sensing Technology: Passive infrared (PIR)

2) Mounting:

a) Direct to the wall or ceiling with anchor bolts
b) Ceiling mounted with 1/2 inch snap in chase nipple, washer and lock nut. Time Delay Setting

3) Light Level Setting: 1 - 100 fc (10 - 1000 lux)

4) Dip Switch Settings

5) HVAC dry contacts: (COM2 Version only)

6) Test Mode: Dip switch setting or programming remote

7) Coverage at 9 feet (2.7 m): 360 deg square mechanically scalable detection zones.

a) Presence: Maximum 22 feet (7 m) or 440 sf (134 sm).
b) Radially: Maximum 26 feet (8 m) or 655 sf (200 sm).
c) Tangentially: Maximum 82 feet (25 m) or 5290 sf (1612 sm).

F. Ultra Sonic Motion Sensors

1. Product: Steinel GLA-US-QUATTRO-COM1[2]-24

a. Characteristics

1) Sensing Technology: Ultrasonic

2) Mounts to a 4" octagon box.

3) Delay Setting

4) Light Level Setting: 1 - 100 fc (10 - 1000 lux)

5) Dip Switch Settings

6) HVAC dry contacts: (COM2 Version only)

7) Test Mode: Dip switch setting or programming remote

8) Coverage at 9 feet (2.7 m):

9) Presence: Maximum 20 feet by 20 feet (6 by 6 m) or 400 sf (36 sm).

10) Radially and Tangentially: Maximum 32 feet by 32 feet (10 by 10 m) or 1,000 sf (100 sm).

2. Product: Steinel GLA-US-HALLWAY-COM1[2]-24

a. Characteristics

1) Sensing Technology: Ultrasonic

2) Mounts to a 4" octagon box.

3) Delay Setting

4) Light Level Setting: 1 - 100 fc (10 - 1000 lux)

5) Dip Switch Settings

6) HVAC dry contacts: (COM2 Version only)

7) Test Mode: Dip switch setting or programming remote

8) Coverage at 9 feet (2.7 m): Maximum 6.5 feet by 65 feet (2 by 20 m) or 422.5 sf (40 sm).

3. Product: Steinel GLA-US-ONEWAY-COM1[2]-24

a. Characteristics

1) Sensing Technology: Ultrasonic

2) Mounts to a 4" octagon box.

3) Delay Setting

4) Light Level Setting: 1 - 100 fc (10 - 1000 lux)

5) Dip Switch Settings

6) HVAC dry contacts: (COM2 Version only)

7) Test Mode: Dip switch setting or programming remote

8) Coverage at 9 feet (2.7 m): Maximum 6.5 feet by 33 feet (2 by 10 m) or 214.5 sf (20 sm).

3.2 Daylight Sensors

A. Indoor Daylight Sensor (Open/Closed loop)

1. Open Loop Function

a. Continually monitors daylight entering window or skylight to enable daylight harvesting applications to provide control of room lighting based on presence of daylight.

b. Light sensitivity sliders:

1) OL: 3-300 foot-candles (factory setting)

2) OL: 30-3000 foot-candles

3) OL: 60-6000 foot-candles

c. Center Axis OL:90°

2. Closed Loop Function

a. Continually monitors daylight at work station location to enable daylight harvesting or lumen maintenance applications to provide control of room lighting based on lighting level at workstation.

b. Light sensitivity slider:

1) CL: 3 to 300 foot-candles

c. Center Axis CL:45°

3. Equipped with 3-wire interface for direct connection to control system utilizing control processor; 24 VDC power from network control bus.

4. Mounting: Surface or flush ceiling mount directly to drywall or drop-tile

5. Product: Crestron GLA-LDL-PC-0-10

B. Outdoor Daylight and Color Temperature Sensor

1. Measures true color temperature and intensity of natural sunlight.

2. Communicates over serial to control system to match indoor lighting with the outdoors.

3. Outdoor rated for rooftop installation.

4. IP67 for watertight operation.

5. CCT of 2,000K to 25,000K.

6. 0 to 100,000 lux.

7. 360 degree semispherical.

8. Product: GLS-LCCT

C. Partition Sensors

1. Single sided diffuse reflective sensing technology.

2. Digital device with control bus connectivity.

3. Surface mounted to 1-gang back box.

4. Trim using decorator face plate to match mounting surface.

5. Product: Crestron GLS-PART-CN

D. Sensor Interface Module

1. Sensor Interface Device: Integrates occupancy sensors and related sensors with control network. In separate enclosure. 4-wire bus providing 24 VDC power to network devices, with two independent sensing inputs.

2. Product: Crestron GLS-SIM

3.3 Control Processor Panel and Distribution Panels

A. Product Family – GLNET and CLP

B. Control processor Panels shall be provided in quantities and locations per the contract drawings, or as required for a fully networked lighting control system.

C. Control processor panels shall be factory assembled in a UL508 Panel shop

D. Shall include the following equipment to support lighting control devices

1. Cabinets
    a. Made of 16AWG galvanized steel
    b. NEMA 1 rated
    c. Product: DIN-EN
2. Processors
    a. Crestron 4-series control system
    b. Modular architecture supports multiple simultaneous running programs.
    c. Ethernet 10/100Base-T and Cresnet Connected
    d. Astronomical time clock with events stored in non-volatile RAM
    e. Native BACnet/IP with support for up to 500 BACnet objects
    f. Built-In Web Server: IIS v.6.0
    g. SNMP remote management.
    h. Active Directory support.
    i. IPv6 ready.
    j. DHCP and DNS Support
    k. Native Email Client
    l. Remote Diagnostics
    m. Remote Program Loading and Administration
    n. SSL security plug in
    o. Support user assigned or dynamic IP address.
    p. Product: Crestron DIN-AP4

3. Power Supplies
    a. Provide regulated 24 VDC power supplies as required to support lighting control equipment
    b. 120 VAC input
    c. Product: Crestron DIN-PWS60
4. Cresnet to Ethernet Bridge
    a. 24v DC Input
    b. IEEE 802.3 Power of ethernet connection.
    c. Serial communication
    d. USB 2.0 for setup.
    e. Product: DIN-CENCN-2-POE
5. Ethernet Distribution
    a. 48V DC Input, 100-240 VAC 50/60 Hz Supply
    b. (5) [16] IEEE 802.3 Ethernet Ports
    c. 32 to 104 degrees Fahrenheit
6. Floor Hub
    a. Connects up to 200 Crestron ZUMMESH-NETBRIDGE devices.
    b. Contain astronomical time clock.
    c. Maintenance is performed via standard web browser.
    d. 1 rack unit mounted
    e. Product: Crestron ZUM-FLOOR-HUB
7. GLNET-CN
    a. Enclosure: DIN-EN-2X18
        1) 16AWG Galvanized steel backbox
        2) 120 Volts AC, 60 Hz
        3) Height: 12.32 in (323 mm)
        4) Width: 14.13 in (359 mm)
        5) Depth: 4.38 in (111 mm)
        6) DIN Rail Detail: (2) 342 mm x 35 mm rails
8. GLNET-ZUM
    a. Enclosure: DIN-EN-3X18
        1) 16AWG Galvanized steel backbox
        2) 120 Volts AC, 60 Hz
        3) Height: 23.50 in (597 mm)
        4) Width: 14.38 in (366 mm)
        5) Depth: 4.44 in (113 mm)
        6) DIN Rail Detail: (3) 342 mm x 35 mm rails

9. GLNET-ZUM-CN
    a. Enclosure: DIN-EN-6X18
        1) 16AWG Galvanized steel backbox
        2) 120 Volts AC, 60 Hz
        3) Height: 38.88 in (989 mm)
        4) Width: 14.38 in (366 mm)
        5) Depth: 4.44 in (113 mm)
        6) DIN Rail Detail: (6) 342 mm x 35 mm rails
10. CLP-HUB-SW-POE-5
    a. Enclosure: DIN-EN-2X18
        1) 16AWG Galvanized steel backbox
        2) 120 Volts AC, 60 Hz
        3) Height: 12.32 in (323 mm)
        4) Width: 14.13 in (359 mm)
        5) Depth: 4.38 in (111 mm)
        6) DIN Rail Detail: (2) 342 mm x 35 mm rails
11. CLP-HUB-SW-POE-10
    a. Enclosure: DIN-EN-2X18
        1) 16AWG Galvanized steel backbox
        2) 120 Volts AC, 60 Hz
        3) Height: 23.50 in (597 mm)
        4) Width: 14.38 in (366 mm)
        5) Depth: 4.44 in (113 mm)
        6) DIN Rail Detail: (3) 342 mm x 35 mm rails
12. CLP-HUB-SW-POE-16
    a. Enclosure: DIN-EN-6X18
        1) 16AWG Galvanized steel backbox
        2) 120 Volts AC, 60 Hz
        3) Height: 38.88 in (989 mm)
        4) Width: 14.38 in (366 mm)
        5) Depth: 4.44 in (113 mm)
        6) DIN Rail Detail: (6) 342 mm x 35 mm rails

3.4 UL924 EMERGENCY OVERIDE

A. Phase Loss Sensor

1. Lighting control panels shown on the contract drawings as emergency life safety shall contain UL924 listed modules and OVR inputs.

2. Provide phase loss sensor with sense for all 3 phases.

3. Upon loss of any of the 3 phases, the phase loss sensor shall trigger the emergency life safety panel's override port(s).

4. Product: Crestron GLS-PLS-120/277.

B. Bypass Relays

1. Switched and 2-wire dimmed loads

a. The UL924 listed 2-wire Emergency Shunt Relay shall allow emergency power to go around the control device to bring emergency power to the load.

b. Product: GLA-ESR

C. Automatic Load Control Relays (ALCR)

1. Switched Loads

a. UL924 listed 2-wire automatic load control relay shall bring emergency life safety lights on to 100% upon loss of power

b. Upon the loss of normal power, the ALCR shall bypass the control device allowing emergency power to access the loads regardless of switch position.

c. Products:

1) Crestron GLA-EPC-PM

2) Crestron GLA-EPC-2

2. 4-Wire dimming loads

a. UL924 listed 4-wire automatic load control relay shall bring emergency life safety lights on to 100% upon loss of power

b. Upon the loss of normal power, the ALCR shall bypass the control device allowing emergency power to access the load regardless of switch position.

c. The ALCR shall contain a normally open relay to open the control wires allowing the lights to come to full bright.

d. The ALCR shall allow for integration with fire alarm.

e. Product: Crestron GLA-EPC-FLV

D. UL1008 Emergency Override

1. Automatic transfer switch (ATS)

2. All dimming and switching loads

a. UL1008 listed automatic transfer device shall transfer emergency power to the load upon 100% loss of power.

b. Upon loss of normal power, the ATS shall allow the flow of emergency power from the emergency circuit regardless of switch position.

c. The ATS shall operate on the branch side of the circuit

d. The ATS shall allow integration with fire alarm

e. Product: Crestron GLA-EPC-D-F-ATS

3.5 Programming and Configuration Software

A. Lighting system configuration software shall allow custom programming for lighting control system.

B. Lighting system configuration software shall generate custom software control interface modules for communication with compatible remote integrated systems.

C. The lighting system configuration software shall be GUI based for programming and development.

D. The custom software control interface shall include the following control data:

1. Complete lighting system control functions.
2. System specific control sets for sub systems and supervisory systems
3. Bidirectional digital and analog data communication.
4. Bidirectional serial data communication.

3.6 Conductors and Cabling

A. Power Supply Side of Remote-Control Power Sources: Comply with requirements of Division 26 Section "Low-Voltage Electrical Power Conductors."

B. UTP Cable: 100-ohm, UTP. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:

C. Communications Control Cable, Non-Plenum Rated: 22 AWG data pair stranded bare copper, and 18 AWG power pair stranded bare copper, Type CM.

1. Product: Crestron CRESNET-NP.

D. Communications Control Cable Plenum Rated: 22 AWG data pair, stranded bare copper and 18 AWG power pair, stranded bare copper, Type CMP, complying with NFPA 262.

1. Product: Crestron CRESNET-P.

E. Communications High-Power Control Cable, Non-Plenum Rated: 22 AWG stranded bare copper data pair, and 12 AWG stranded bare copper power pair, Type CM.

1. Product: Crestron CRESNET-HP-NP.

PART 4 EXECUTION

4.1 FIXTURE TESTING

A. Contractor shall provide lighting control factory test reports for each fixture specified on this project

B. Test report shall include

1. Confirmation of compatibility with control device
2. Dimming Range
3. Performance notations

4.2 Plug Load Control

A. Plug load controls as shown on the contract drawing shall be part of the lighting control system.

B. Plug loads shall operate in occupancy mode (Auto-on, Auto-off).

4.3 Engraving

A. Keypad buttons shall be factory engraved using laser technology

B. Initial shipment of keypads shall be factory engraved per the sequence of operations specified herein and shown on the contract documents

C. Custom keypad engravings shall be provided as part of the close out procedures.

4.4 BMS Integration

A. The lighting control system shall be integrated with the BMS Johnson control Metasys system as specified in DIV. 25.

B. Communication shall occur using BACNET/IP Protocol.

C. Contractor shall provide licenses for each of the following objects and shared amongst the BMS system

1. Occupancy Status
2. Zone On/Off/Dim
3. Photocell reading

D. The lighting control system shall also accept time clocked events from the BMS system

E. Provide necessary coordination labor for integration of all BACNET objects listed.

4.5 AV Integration

A. The lighting control system shall be integrated with the AV solutions as specified in DIV.26

B. The lighting and AV systems shall interface via Ethernet communication or RS232.

C. Contractor shall provide ethernet drops as required for the lighting control system to connect to the AV system.

D. The following objects shall be shared with the AV system:

1. Occupancy Status
2. Zone On/Off/Dim
3. Photocell reading
4. Scene preset recalls

E. Provide necessary coordination labor for integration of all AV objects listed hereto before.

4.6 System Functions and Sequences

A. The system shall be capable of the following lighting control functions:
    1. Scene Creation: Store levels of selected fixture circuits in preset groups.
    2. Scene Recall: recall previous stored scenes.
    3. All zones off
    4. Raise/lower level of all zones
    5. Password entry for touchscreen access
    6. Room/Zone selection
    7. Raise/lower room shades
    8. Schedule events to be automatically recalled

B. Circadian lighting control system shall be capable of the following lighting control functions:
    1. Adjust light that can cycle close to 24 hours
    2. Manage color temperature and intensity
        a. Automatic adjustment of color and intensity throughout the day
        b. Intensity range meeting or exceeding – 1500 – 2200 lumens
        c. Color range meeting or exceeding – 2700 – 6000 kelvins
    3. Manual override for users
    4. Optional user interfaces for circadian control:
    5. Touchscreen and virtual touchscreen interfaces
    6. Keypad
    7. Astronomical timeclock adjustments
    8. Color temperature and intensity sensor

User Interface Control Functions

C. The keypad interface shall be capable of the following system control functions:
    1. Scene Recall
    2. Raise/Lower
    3. Off

D. Touchscreen and Virtual touch screen interfaces shall be capable of the following system control functions:
    1. Password Entry
    2. Multiple levels
    3. Room/Zone selection
    4. Scene Recall
    5. Raise/Lower
    6. Shade Control
    7. Timeclock Events
    8. Customer logo and color scheme

E. Optional control sequences for advanced control:
    1. Occupancy adjustments

2. Sensor Timeout
3. Control logic (occupancy or vacancy)
4. Lighting Scenes
5. Individual zone control override
6. Timeclock adjustments
7. Modify timeclock activation schedule
8. Select/unselect pre-programmed timeclock events
9. Display all timeclock events
10. Daylight Harvesting Adjustments
11. Low end trim
12. Response time
13. Zone control
14. Scene Recall
15. Fade time
16. Color scene recall

4.7 Time Clock Events

A. The lighting control system shall have astronomical time clocked events. 6-time clock events shall be provided.

B. End user shall have the option to create additional time clock events via touch screen or XPANEL interfaces.

4.8 Installation

A. Prior to installation, examine work area to verify measurements, and that commencing installation complies with manufacturer's requirements.

B. Comply with requirements of Division 26 Sections "Common Work Results for Electrical."

C. Do not install network power controls until space is enclosed, HVAC systems are running, and overhead and wet work in space are complete.

D. Install network power switching controls in accordance with manufacturer's instructions.

E. Grounding: Provide electrical grounding in accordance with NFPA 70.

4.9 Manufacturer Supported Services

A. Pre-wire

1. Manufacturer trained and authorized personnel shall provide on-site visit during the rough-in stage of the installation. At this time wiring topologies and terminations shall be reviewed with the Contractor.

B. Startup

1. Provide manufacturer’s certified system startup and adjustment.

2. Switch each load on and off with manual line test feature of the power switching module before installing processors.

3. Perform operational testing to verify compliance with Specifications. Adjust as required.

C. Tuning

1. Within 3 months of the date of Substantial Completion provide onsite service to adjust the system to account for actual occupied conditions.

D. Training

1. Within 30 days, Factory authorized service representative to instruct owner's staff to adjust, operate and maintain network power switching systems; and provide instruction using the system software.

2. Demonstration: Schedule demonstration with Owner.

3. Training: Train Owner's personnel to operate, maintain, and program network power switching systems.

4. Furnish set of approved submittals, and record drawings of actual installation for Owner's personnel in attendance at training session.

SECTION 262413 - SWITCHBOARDS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Main and distribution switchboards.

PART 2 - PRODUCTS

2.1 GENERAL

A. Approved Manufacturers:

1. Square D
2. Siemens
3. Cutler Hammer

2.2 SWITCHBOARD CONSTRUCTION AND RATINGS

A. Factory-assembled, dead front, metal-enclosed, and self-supporting fusible switchboard assembly conforming to NEMA PB2, and complete from incoming line terminals to load-side terminations.

B. Main Section Devices: Individually mounted and compartmented.

C. Distribution Section Devices: Group mounted.

D. Auxiliary Section Devices: Individually mounted and compartmented.

E. Bus Material: Copper, sized in accordance with NEMA PB 2.

F. Bus Connections: Bolted, accessible from front only for maintenance

G. Bus bars shall be fully isolated, braced for minimum ampere rms symmetrical rating.

H. The bus shall extend the full height of the distribution sections to provide space for future breakers.

I. Provide a 1 X 1/4 inch copper ground bus through the length of the switchboard.

J. Provide metering transformer compartment for Campus Facility’s use.

K. Enclosure shall be NEMA PB 2; Type 1 - General-Purpose. Sections shall align at front and rear.

L. Finish: Manufacturer's standard light gray enamel over external surfaces. Coat internal surfaces with minimum one coat corrosion-resisting paint, or plate with cadmium or zinc.

M. Future Provisions: In addition to the 25% spare devices and capacity (at the end of the current construction process), provide a minimum of 15 inches of fully equipped space for future devices with bussing and bus connections, suitably insulated and braced for short circuit currents.

2.3 SWITCHING AND OVER-CURRENT PROTECTIVE DEVICES

A. Fusible Switch Assemblies (600 Amperes and Smaller): Quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle. Provide interlock to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse Clips: Designed to accommodate Class 'R' fuses, type as specified, with Class 'R' rejection clips.

B. Fusible Switch Assemblies (800 Amperes and Larger): Bolted pressure contact switches. Fuse Clips: Designed to accommodate Class L fuses

END OF SECTION 262413

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Service and distribution panelboards.

B. Lighting and appliance branch circuit panelboards.

PART 2 - PRODUCTS

2.1 RATINGS

A. Definitions:

1. Fully rated equipment shall be defined as equipment where all devices in that equipment shall carry a minimum of the AIC rating that is specified. The existing Campus Medium Voltage Secondary loop carries a maximum of 20,000 A.I.C.

B. The panelboards shall be fully rated. All new panels shall accommodate 25% spare breakers and capacity for future use (after current construction process has been completed).

2.2 MAIN AND DISTRIBUTION PANELBOARDS

A. General

1. Approved Manufacturers:

a. Square D QMB, I-Line

b. Siemens F2, P4

c. Cutler Hammer PRL4, PRL5

B. Panelboards: NEMA PB 1.

C. Enclosure: NEMA PB 1; Type 1.

D. Provide cabinet front with concealed trim clamps and hinged trim on door to allow access to wiring gutters without removal of trim and flush lock. Finish in manufacturer's standard gray enamel.

E. Provide panelboards with copper bus. Provide copper ground bus in all panelboards.

F. Molded Case Circuit Breakers: Provide circuit breakers with integral thermal and instantaneous magnetic trip in each pole.

G. Molded Case Circuit Breakers with Current Limiters: Provide circuit breakers with replaceable current limiting elements, in addition to integral thermal and instantaneous magnetic trip in each pole.

2.3 Current Limiting Molded Case Circuit Breakers: Provide circuit breakers with integral thermal and instantaneous magnetic trip in each pole, coordinated with automatically resetting current limiting elements in each pole

END OF SECTION 262416

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Device plates and box covers
B. Receptacles including GFCI.
C. Wall switches
D. Wall dimmers
E. Local daylighting controls
F. Indoor occupancy and vacancy sensors

PART 2 - PRODUCTS

2.1 DEVICE COLOR

A. All switch, receptacle, outlet, and coverplate colors shall be verified with Architect, unless indicated otherwise.

2.2 COVERPLATES

A. All switches, receptacles, and outlets shall be complete with the following:

1. Unbreakable thermoplastic/thermoset plastic coverplates in finished spaces where wall are finished.

2. #302 stainless steel coverplates in unfinished spaces for flush boxes.

3. Galvanized steel coverplates in unfinished spaces for surface mounted boxes.

B. Where several devices are ganged together, the coverplate shall be of the ganged style for the number of devices used.

C. Plate securing screws shall be metal with head color matching the wall plate finish.

2.3 RECEPTACLES

A. NEMA 5-20R Duplex Receptacle:

1. 125 volt, 20 amp, back wired, 3-wire grounding type with impact resistant thermoplastic face and steel back strap.

2. Approved Manufacturers: Hubbell 5352A, Leviton, 5362-S, Pass & Seymour 5362, Cooper 5352.

B. NEMA 5-20R Ground Fault Duplex Receptacle:

1. 125 volt, 20 amp, back wired, 3-wire grounding type with test and reset buttons in impact resistant thermoplastic face.

2. Device shall perform self-test of GFCI circuitry in accordance with UL 943.

3. Approved Manufacturers: Hubbell GF20L, Leviton GFNT2, Pass & Seymour 2097, Cooper SGF20.

2.4 WALL SWITCHES

A. Single Pole Switch:

1. Single throw, 120/277 volt, 20 amp maintained contact. Toggle handle, side and back wired.

2. Approved Manufacturers: Hubbell HBL1221, Leviton 1221-2, Pass & Seymour PS20AC1, Cooper AH1221.

2.5 WALL DIMMERS

A. UL listed with integral air-gap switch for on/off control.

B. Integral EMI/RFI suppression.

C. Non-viewable heat sink.

D. Dimmer compatibility and wiring with the load being controlled shall be verified by Contractor prior to purchase and installation.

E. Dimmer to match device color.

F. 600 Watt Single Pole Incandescent Dimmer:

1. 120 volt, linear slider operator with positive off. Mount in single gang box.

2. Approved Manufacturers: Lutron N-600, Lightolier MP600, Pass & Seymour CD700.

G. 1000 Watt Single Pole Incandescent Dimmer:

1. 120 volt, linear slider operator with positive off. Mount in single gang box.

2. Approved Manufacturers: Lutron N-1000, Lightolier MP1000, Pass & Seymour CD1100.

H. 1500 Watt Single Pole Incandescent Dimmer

1. 120 volt, linear slider operator with positive off. Mount in double gang box.

2. Approved Manufacturers: Lutron N-1500, Lightolier MP1500, Pass & Seymour CD1600.

I. 2000 Watt Single Pole Incandescent Dimmer:

1. 120 volt, linear slider operator with positive off. Mount in double gang box.

2. Approved Manufacturers: Lutron N-2000, Lightolier MP2000, Pass & Seymour CD2000.

J. Fluorescent Ballast Dimmer:

1. 120 volt, linear slider operator with positive off. 16 amp maximum capacity.

2. Approved Manufacturers: Lutron NF-10, Lightolier MP1500F.

K. LED Electronic Driver Dimmer:

1. 120 277 volt, decora style linear slider operator with positive off. Color to match adjacent devices. Luminaire manufacturer shall list compatible dimmer manufacturers and models. 0-10V dimmers shall comply with IEC 60629 Annex E.

2. Approved Manufacturers: Compatible with provided LED driver.

L. Low Voltage Electronic Ballast Dimmer:

1. 120 volt, linear slider operator with positive off. 450 watt capacity.

2. Approved Manufacturers: Lutron NELV-450, Lightolier MP625QE.

2.6 LOCAL DAYLIGHTING CONTROLS

A. Standalone Interior Photo Sensors:

1. Daylight Level Sensor - On/Off Control - One Zone:

a. On/Off control. Range of 10-200 FC. Adjustable deadband prevents cycling. Adjustable time delay. 120/277 volt.

b. Approved Manufacturers: Watt Stopper LS-102, Sensor Switch CM-PC, Hubbell Automation DLCPC Series, Greengate PPS-4.

2. Daylight Level Sensor and Controller - 0-10V Dimming - One Zone:

a. Dimming control of one 0-10V zone. Range of 10 to 200 FC. Adjustable deadband prevents cycling. Adjustable time delay. Coordinated with dimming ballast prior to submittal.

b. Approved Manufacturers: Watt Stopper LS-301, Hubble Automation DLC7, Sensor Switch N-CMADC.

3. Sensor shall detect changes in ambient light level and provide triggering of lighting groups in area based on sequence of operation.

4. Sensor shall be configurable via DIP switches at device or via handheld wireless remote programming unit. Settings shall include:

a. Ambient sensitivity range between 1 and 1,000 foot-candles.
b. Time delay of 5 to 300 seconds.
c. Trigger setpoints with deadband adjustment.

5. Sensor shall be ceiling- or wall-mounted for range and viewing angle meeting application requirements.

6. Output signal from sensor shall be linear with light level.

2.7 INDOOR OCCUPANCY AND VACANCY SENSORS

A. General Description: Wall- or ceiling-mounting, solid-state units with a separate power supply/relay unit.

1. Operation: Unless otherwise indicated, turn lights on when covered area is occupied and off when unoccupied, with a time delay for turning lights off, adjustable over a minimum range of 1 to 30 minutes. Vacancy sensors require a manual switch operation to turn lights on and off, with a time delay for turning lights off when unoccupied.

2. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.

3. Relay Unit: Dry contacts rated for 20 A ballast load at 120 and 277 VAC, for 13 amp tungsten at 120 VAC, and for 1 hp at 120 VAC. Power supply to sensor shall be 24 V dc, 150-mA, Class 2 power source as defined by NFPA 70.

4. Mounting:

a. Sensor: Suitable for mounting in any position on a standard outlet box.

b. Relay: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure. Mount relay above accessible ceiling near entry door to room or area.

c. Time Delay and Sensitivity Adjustments: Recessed and concealed.

5. Indicator: LED to show when motion is being detected during testing and normal operation of the sensor.

6. Bypass Switch: Override the on function in case of sensor failure.

7. Power Supply and Slave Packs: Provide as required for sensor quantity and switching scheme. Mount to standard 1/2” knockout on electrical box above accessible ceiling near entry door to room or area. Sensor power shall be from emergency circuit if emergency lighting is in the area.

8. Detection Coverage (Room): Detect occupancy anywhere in an area based on hand motion.

9. Detection Coverage (Corridor): Detect occupancy based on a half-step motion.

B. Dual-Technology Type: Detect occupancy by using a combination of PIR and ultrasonic detection methods in area of coverage. Particular technology or

combination of technologies that controls on and off functions shall be selectable in the field by operating controls on unit.

1. 360 Degree Coverage Pattern:

   a. Frequency greater than 40 KHz. Dual sensing verifications (requires both technologies to activate), either technology maintains on status. Integrated ambient light level sensor (2 to 200 FC range), adjustable sensitivity and time delay, integrated isolated relay contact. Sensor shall control all circuits in area, unless noted otherwise. Initial settings: ambient sensor 40 FC.

   b. Approved Manufacturers: Watt Stopper DT 300 Series, Hubbell OMNI-DT2000 or ATD2000C, Greengate OAC-DT, Leviton OSC##-MOW, Sensor Switch CM PDT 10.

2. Wall Mounted on Adjustable Swivel Mount:

   a. Wall or ceiling sensor with adjustable settings to allow manual on/auto off or auto on/auto off. Integrated ambient light level sensor (2 to 100 FC range).

   b. Approved Manufacturers: Watt Stopper DT-200 Series, Hubbell LODTRP, Leviton OSM12--M series, Sensor Switch WvPDT 16 Series.

3. Wall Switch:

   a. Multi-relay wall switch with manual on/auto off for two separate loads. 120/277 VAC load relay rating of 0-800 W for ballast, LED or tungsten. 5-, 15-, 30-minute adjustable OFF delay. Coverage of minor motion in 12’ x 15’ pattern.

   b. Approved Manufacturers: Watt Stopper DW-200 Series, Hubbell LHMTD, Leviton OSSMD series, Sensor Switch WSD-PDT 2P Series.

4. Sensitivity Adjustment: Separate for each sensing technology.

5. Detection Coverage:

   a. Task Areas: Detect occupancy anywhere in an area based on hand motion.

   b. Circulation Areas: Detect occupancy anywhere in an area based upon half-step walking motion.

C. Mask sensors where necessary to prevent nuisance switching from adjacent areas.

END OF SECTION 262726

SECTION 262923 - VARIABLE FREQUENCY DRIVES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Variable frequency drives

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. ABB

B. Danfoss

C. Toshiba

2.2 DESCRIPTION

A. Converts 60 Hertz input power at voltage specified to a variable AC frequency and voltage for controlling the speed of AC squirrel cage motors. The controller shall be suitable for use with standard NEMA B squirrel cage 1.15 service factor induction motors without requiring any modifications to the motor or the drive.

B. Controller shall have sufficient capacity to provide speed control of the motors shown or noted throughout the specified environmental operating conditions.

C. Controller shall have the functional components listed below:

1. Door interlocked input circuit breaker/fused switch.

2. Input rectifier section to supply fixed DC bus voltage.

3. Smoothing reactor for DC bus.

4. DC bus capacitors.

5. Control transformer.

6. Separate terminal blocks for power and control wiring.

7. Terminal block for operator controls.

8. Sine weighted PWM generating inverter section

2.3 DESIGN

A. Pulse Width Modulated (PWM) Variable Frequency Drives:

1. Converter shall be of a diode bridge design with a sine-weighted PWM inverter section.

2. Pulse width modulated (PWM) drives shall be supplied with drive input line reactors with a minimum impedance of 3%. Reactors shall be installed to filter entire drive input circuit.

3. Pulse width modulated (PWM) drives shall be supplied with drive input harmonic filter to reduce the total harmonic distortion to less than the IEEE519-1992 limits at the utility service entrance.

4. Drives that are located beyond the manufacturer's recommended maximum distance from the motor shall be provided with dV/dt (long lead) filters.

2.4 PRODUCT FEATURES

A. Display: Provide integral digital display to indicate all protection faults and drive status (including overcurrent, overvoltage, undervoltage, ground fault, overtemperature, phase loss, input power ON, output voltage, output frequency, and output current.

B. Communications: Provide a communications card to interface VFD with Facility Management Control System (FMCS). Coordinate interface requirements with the FMCS provided under Section 23 09 00. Interface shall allow all parameter settings of VFD to be programmed via FMCS control and displayed on FMCS operator workstation. Provide capability for VFD to retain these settings within the nonvolatile memory.

C. Three- Contactor Automatic Bypass:

1. Provide contactors, motor running overload protection, under-voltage and loss of phase protection, and short circuit protection for full voltage, non-reversing operation of the motor. Include isolation switch to allow maintenance of inverter during bypass operation.

2. All bypass circuitry shall be located within the same enclosure as the variable frequency drive.

3. All fire alarm and/or smoke control interconnections (e.g., air handling unit shutdown) shall apply regardless of whether control is through VFD or bypass.

4. Provide a Drive-Bypass Selector Switch.

5. Provide nameplate with instructions for switching from drive to bypass and

from bypass to drive. Provide instructions for isolating VFD for maintenance.

D. Enclosure:

1. NEMA 12

2. NEMA 4 - Prior Owner approval required.

END OF SECTION 262923

SECTION 263213 - PACKAGED ENGINE GENERATOR SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Packaged engine generator system

B. Exhaust silencer and fittings

C. Fuel fittings and day tank

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Caterpillar.

B. Cummins Power Generation.

C. Kohler.

D. Generac

2.2 PACKAGED ENGINE-GENERATOR SET

A. Packaged engine-generator set shall be a coordinated assembly of compatible components.

B. Safety Standard: Comply with ASME B15.1 and UL 2200.

C. Nameplates: Each major system component shall be equipped with a nameplate to identify manufacturer’s name and address, model and serial number, and component rating in integrated set and as required by the contract documents.

D. Fabricate engine-generator set mounting frame and attachment of components to resist generator-set movement during a seismic event when generator-set mounting frame is anchored to building structure.

E. Mounting Frame: Adequate strength and rigidity to maintain alignment of mounted components without depending on concrete foundation. Mounting frame shall be free from sharp edges and corners and shall have lifting attachments arranged for lifting with slings without damaging components. Provide a rigging diagram permanently attached to the mounting frame to indicate the capacity of each lifting attachment and the generator-set center of gravity.

2.3 ENGINE

A. Type: Water-cooled in-line or V-type, four-stroke cycle spark-ignition compression ignition diesel electric ignition internal combustion engine.

B. Rating: Sufficient to operate at 100 percent load for two hours at specified elevation and ambient limits.

C. Fuel: Appropriate for use of No. 2 fuel oil.

D. Engine Speed: 1800 RPM.

E. Governor: Isochronous type with speed sensing.

F. Safety Devices: Engine shutdown on high water temperature, low oil pressure, overspeed, and engine overcrank. Limits as selected by manufacturer.

G. Fuel System:Engine mounted diesel fuel pump and relief-bypass valve.

H. Fuel Supply System: Comply with UL 142 fuel oil tank.

1. Day Tank: UL listed fuel tank with AHJ Required/Owner requested (whichever is greater) rated capacity. Integral rupture basin with 150% of nominal capacity and leak detection. Dual integral self-priming pumps and level control with indication. Low-level sensor at 25% with alarm and contacts. High-level sensor with alarm, contacts, and redundant fuel shutoff. Include flexible fuel line connections for all supply and return lines. Provide with emergency vent cap.

END OF SECTION 263213

SECTION 263600 - TRANSFER SWITCH

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Automatic transfer switch and bypass/isolation switch Positive Displacement Meters.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. ASCO

B. Russelectric, Inc.

C. Zenith Controls, Inc.

2.2 AUTOMATIC TRANSFER AND BYPASS/ISOLATION SWITCH

A. Description: NEMA ICS 2; automatic transfer switch with manual bypass switch.

B. Configuration: Draw out type electrically operated, mechanically held transfer switch with manually operated CONNECTED, TEST, and DISCONNECTED draw out positions, and with mechanically operated, mechanically held transfer switch connected to bypass automatic switch.

C. Bypass Switch Ratings: Match automatic transfer switch for electrical ratings.

D. Communications: Provisions to be provided to communicate with campus SCADA system.

END OF SECTION 263600

SECTION 264300 - SURGE PROTECTION DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This section describes materials and installation requirements for low voltage surge protection devices (SPD) for the protection of all AC electrical circuits. SPD equipment to be installed at designated service entrance equipment, distribution panels, electronic equipment, and identified receptacle devices.

PART 2 - PRODUCTS

2.1 DESCRIPTION

A. General: The unit shall provide transient voltage suppression, surge current diversion and high-frequency noise attenuation, when connected in parallel to the facilities distribution system. The unit MCOV shall not be less than 115% of the nominal system voltage. Operating frequency shall be for a 60 Hz system. The unit shall provide protection in all normal modes for "wye" and "delta" systems. The short circuit current rating shall be the larger of the listed value on the drawings or as required by the equipment protected.

2.2 RATINGS

A. Service Entrance Suppressors

1. For 277/480 and 120/208 volt, 3 phase, 4 wire, type 2, category C3 unit.

   a. Surge current capacity: 100,000/200,000 amps per protection mode/phase

   b. Nominal Discharge Current: 20 kA.

   c. Mounting: Remote (close proximity) fed by circuit breaker/fusible switch.

   d. Voltage Protection Rating: Refer to requirements below.

   e. Components: Minimum component size of 20mm metal oxide varistors (MOV).

   f. Disconnect: Surge-rated disconnect with 200,000 SCCR.

2. Approved Manufacturers:

   a. Square D Surelogic EMA Series

b. Siemens TPS3 Series

c. Cutler Hammer SPD Series

d. Current Technology Current Guard Plus

e. Emerson Network Power 560 Series

B. Secondary Distribution Suppressors:

1. For 277/480 and 120/208 volt, 3 phase, 4 wire, type 2, category B3/C1 unit.

a. Surge current capacity: 60,000/120,000 amps per protection mode/phase

b. Nominal Discharge Current (IN): 20 kA.

c. Mounting: Remote (close proximity) fed by circuit breaker/fusible switch.

d. Voltage Protection Rating: Refer to requirements below.

e. Components: Minimum component size of 20mm metal oxide varistors (MOV).

2. Approved Manufacturers:

a. Square D Surgelogic EMA Series

b. Siemens/APT TPS3 Series

c. Cutler Hammer SPD Series

d. Current Technology Current Guard Plus

e. Emerson Network Power 510 Series.

C. Critical Load Protection – Fixed Equipment:

1. For 120 volt, 1 phase, 3 wire, type 3, category A3 unit.

a. Surge current capacity (I_N): 15,000/30,000 amps per protection mode/phase.

b. Mounting: External, NEMA 12 enclosure

c. Components: Nonmodular units composed of 20mm Metal Oxide Varistors (MOV). Series inductors, SAD, or selenium cells may be used in addition to MOVs.

d. Protection modes and UL 1449 clamping voltage: 475 Volt L-N, L-G, and N-G.

D. Receptacles:

1. For 120 volt, 1 phase, 3 wire, type 3, category A3 unit.

a. Surge current capacity (IN): 12,000 amps per protection mode.

b. Components: 20mm MOV.

c. Maximum Continuous Operating Voltage: 150 Volts.

END OF SECTION 264300

REVISED 09.13.2019
SECTION 265100 - LIGHTING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Interior luminaires and accessories
B. Exterior luminaires and accessories

1.2 REFERENCES

A. Project site classification as defined in IESNA RP-33 LZ2

1.3 SUBMITTALS

A. LED luminaire submittals shall include photometric report per IESNA LM-79-08 for the latest generation system being furnished, including independent testing laboratory name, report number, date, luminaire model number, input wattage, luminaire, and light source specifications. Manufacturer origin of LED chipset and driver shall be submitted.

B. For all LED luminaires specified as dimmer controlled, submit dimmer device data that is approved by manufacturer of submitted luminaire and that Contractor proposes to furnish and install. Contractor is responsible for verifying that installed dimming controls are compatible with and approved by the luminaire manufacturer.

C. LEED Requirements:

1. Light Pollution Reduction:

a. Exterior Luminaires: Submit manufacturer data showing percentage of light lumens emitted at or above 90° from nadir for each luminaire type.

2. Toxic Material Reduction:

a. Submit manufacturer published data for each lamp type being furnished, indicating mercury content in milligrams per lamp.

3. Interior Lighting:

a. The interior lighting shall be incompliance with the IECC as directed by the level of the LEED scorecard.

PART 2 - PRODUCTS

2.1 INTERIOR LUMINAIRES AND ACCESSORIES - GENERAL

A. Luminaires shall utilize LED source wherever possible, any deviations shall be approved by Owner. Basis of Design is Metalux, 2x2 LED Flat Panel Model #22FP3240C; Type “X” APX Series LED Exit Sign Model APX7R 120/277 V LED. All lighting densities in all areas shall be in compliance with the latest adopted IES

(Illuminating Engineering Society) recommendations and the IECC (International Energy Conservation Code).

2.2 EXTERIOR LUMINAIRES AND ACCESSORIES - GENERAL

A. Luminaires shall utilize LED source wherever possible, any deviations shall be approved by Owner. Actual light fixtures shall be selected by the project Architect and approved by the Owner at Schematic Design. All lighting densities in all areas shall be in compliance with the latest adopted IES (Illuminating Engineering Society) recommendations and the IECC (International Energy Conservation Code).

B. Listed for wet or damp location as scheduled. Fountain and pool luminaires shall be listed for submersible location to meet depth specified.

C. Provide low temperature ballasts or LED drivers, with reliable starting to -20°F.

D. In-grade luminaires shall have lamp/optic separation to prevent surface temperature from exceeding 115°F. Compartment separation of wire entry and control gear/lamp chamber.

2.3 LIGHT EMITTING DIODE (LED) LUMINAIRE SYSTEMS

A. Light emitting diodes used in interior applications shall have a minimum color rendering index (CRI) of 80. Light emitting diodes used in exterior applications shall have a minimum color rendering index (CRI) of 70. Color temperature of the luminaires shall be as noted on the luminaire schedule.

B. LED chip arrays specified as color changing shall have chip colors as noted on the luminaire schedule.

C. LED chips shall be wired so that failure of one chip does not prohibit operation of the remainder of the chip array.

D. LED Driver:

1. Solid state driver with integral heat sink. Driver shall have overheat, short-circuit and overload protection, power factor 0.90 or above and maximum total harmonic distortion of 20%. Surge suppression device for all exterior luminaires.

2. Drivers shall have dimming capabilities as outlined in the luminaire schedule for each luminaire type.

3. Driver shall have a minimum of 50,000 hours rated life.

END OF SECTION 26 51 00

BRiC PARTNERSHIP, LLC
CONSULTING ENGINEERS

SHOP DRAWING REVIEW

DATE: 4/18/19

TO: Oates Associates

SUBJECT: 265600 Site Lighting

PROJECT: SIUE Korte Stadium/Lot A Reconstruction
Edwardsville, IL 62026

ENGINEER'S REVIEW		RESPONSE REQUIRED OF CONTRACTOR	
☑	No Exception Taken	☐	Confirm Markings
☐	Rejected	☐	Resubmittal Required
☑	Note Markings	☑	No Resubmittal Required

Engineer's review is for general conformance with the design concept and contract documents. Markings and/or comments shall not be construed as relieving the Contractor from compliance with the project plans and specifications, nor departure therefrom. The Contractor remains responsible for details and accuracy, for confirming and correlating all quantities and dimensions, for selecting fabrication processes, for techniques of assembly, and for performing his work in a safe manner. All resubmittals shall have the changed information clearly highlighted by the submitter. Review of resubmittals only applies to the above highlighted information and is not a mechanism for granting approval to items not specifically highlighted.

Signature Zachary Schobert

COMMENTS:

Korte Stadium

- **Type A – No Exception Taken**
- **Type B – No Exception Taken**

Lot A Reconstruction

- **Type A – No Exception Taken. Note:** There are 10 Type A fixtures located between Lot A (6) and P-10 (4). Type A fixture at entry of Lot P-10 shall be on the Full circuit.
- **Type B – No Exception Taken**
- **Type C – No Exception Taken**
- **Type C – No Exception Taken**

J.F. ELECTRIC

Office Location:
100 Lakefront Pkwy
Edwardsville, IL 62025

Mailing Address:
P.O. Box 570
Edwardsville, IL 62025

Main: 618.797.5353
Toll Free: 800.339.8383
Fax: 618.797.5354

jfelectric.com

SUBMITTAL

DATE.....April 18, 2019

PROJECT.....**SIUE KORTE STADIUM/LOT A RECONSTURCTION**
Edwardsville, IL 62026

GENERAL CONTRACTOR.....**RCS Construction**
960 East Airline Drive
East Alton, IL 62024

ARCHITECT.....**Oates Associates**
100 Lanter Court, Suite 1
Collinsville, IL 62234

SUBMITTED BY.....**J. F. ELECTRIC, INCORPORATED**

BRANCH OF WORK.....**ELECTRICAL**

EQUIPMENT.....Site Lighting

SECTION.....265600

J.F. Electric, Inc.
JOB# 219614.06 DATE: 4/18/19 BY: WNB
APPROVED SUBJECT TO:
☐ REQUIREMENTS OF JOB PLANS & SPECS.
☒ APPROVAL OF ENGINEER AND/OR OWNER.
☐ REQUIREMENTS OF OUR PURCHASE ORDER
☐ NOTATIONS MADE HERE ON
Corrections, comments or approvals indicated on this review do not relieve the supplier from the requirements of the Contract Documents. The approval noted is preliminary to the Final Acceptance by the Engineer or Owner and indicates conformance with the specifications as we understand them.

LIGHTING ASSOCIATES
3216 S. BRENTWOOD BLVD.
WEBSTER GROVES MO 63119
Phone: (314) 531-3500
Fax: (314) 531-3737

Date: Apr 18, 2019

Job Name
(new) SIUE KORTE STADIUM - LIGHT FIXTURES
LAI19-169706
EDWARDSVILLE IL

Bid Date
Apr 9, 2019

Submittal Date
Apr 16, 2019

Architect:
BRiC PARTNERSHIP
100 EAST WASHINGTON
BELLEVILLE IL 62220

Engineer:
OATES AND ASSOCIATES
100 LANTER COURT, SUITE 1
COLLINSVILLE IL

Date: Apr 18, 2019

Transmittal

LIGHTING ASSOCIATES
3216 S. BRENTWOOD BLVD.
WEBSTER GROVES MO 63119
Phone: (314) 531-3500
From: Tyler Woldridge

Project **(new) SIUE KORTE STADIUM - LIGHT FIXTURES**
Quote# LAI19-169706
Location EDWARDSVILLE IL
Contact:

ATTACHED WE ARE SENDING YOU 1 COPY OF THE FOLLOWING ITEM:

☐ Drawings ☐ Specifications Other:
☐ Prints ☐ Information
☐ Plans ☐ Submittals

THESE ARE TRANSMITTED FOR:

☐ Prior Approval ☐ Resubmittal for Approval ☐ Record
☐ Approval ☐ Corrections Bids due on:
☐ Approval as Submitted ☐ Your Use Other:
☐ Approval as Noted ☐ Review and Comment

Qty	Type	MFG	Part
~~4~~ 7	A	MCGRAW	GLEON-AF-03-LED-480-T4W-BZ-MS/ DIM-L40W
~~4~~ 7	A	VALMONT INDUSTRIES, INC.	DS210-850A350-D2-FP-DB-FBC-AB
22	B	MCGRAW	GLEON-AF-03-LED-480-T4W-BZ-MS/ DIM-L40W
11	B	VALMONT INDUSTRIES, INC.	DS210-850A350-D2-FP-DB-FBC-AB
1	TOOL	MCGRAW REMOTE CONFIGURATION TOOL PACKED	FSIR-100-PK

WNB

Submitted by LIGHTING ASSOCIATES

Job Name:
(new) SIUE KORTE STADIUM - LIGHT FIXTURES
Architect: BRiC PARTNERSHIP (BELLEVILLE)
Engineer: OATES AND ASSOCIATES (COLLINSVILLE)

Catalog Number:
GLEON-AF-03-LED-480-T4W-BZ-MS/DIM-L40W
Notes:

Type:
A
LAI19-169706

McGraw-Edison

Catalog #		Type	
Project			
Comments		Date	
Prepared by			

DESCRIPTION

The Galleon™ LED luminaire delivers exceptional performance in a highly scalable, low-profile design. Patented, high-efficiency AccuLED Optics™ system provides uniform and energy conscious illumination to walkways, parking lots, roadways, building areas and security lighting applications. IP66 rated and UL/cUL Listed for wet locations.

SPECIFICATION FEATURES

Construction
Extruded aluminum driver enclosure thermally isolated from Light Squares for optimal thermal performance. Heavy-wall, die-cast aluminum end caps enclose housing and die-cast aluminum heat sinks. A unique, patent pending interlocking housing and heat sink provides scalability with superior structural rigidity. 3G vibration tested and rated. Optional tool-less hardware available for ease of entry into electrical chamber. Housing is IP66 rated.

Optics
Patented, high-efficiency injection-molded AccuLED Optics technology. Optics are precisely designed to shape the distribution maximizing efficiency and application spacing. AccuLED Optics create consistent distributions with the scalability to meet customized application requirements. Offered standard in 4000K (+/- 275K) CCT 70 CRI. Optional 3000K, 5000K and 6000K CCT.

Electrical
LED drivers are mounted to removable tray assembly for ease of maintenance. 120-277V 50/60Hz, 347V 60Hz or 480V 60Hz operation. 480V is compatible for use with 480V Wye systems only. Standard with 0-10V dimming. Shipped standard with Eaton proprietary circuit module designed to withstand 10kV of transient line surge. The Galleon LED luminaire is suitable for operation in -40°C to 40°C ambient environments. For applications with ambient temperatures exceeding 40°C, specify the HA (High Ambient) option. Light Squares are IP66 rated. Greater than 90% lumen maintenance expected at 60,000 hours. Available in standard 1A drive current and optional 600mA, 800mA and 1200mA drive currents (nominal).

Mounting
STANDARD ARM MOUNT: Extruded aluminum arm includes internal bolt guides allowing for easy positioning of fixture during mounting. When mounting two or more luminaires at 90° and 120° apart, the EA extended arm may be required. Refer to the arm mounting requirement table. Round pole adapter included. For wall mounting, specify wall mount bracket option. QUICK MOUNT ARM: Adapter is bolted directly to the pole. Quick mount arm slide into place on the adapter and is secured via two screws, facilitating quick and easy installation. The versatile, patent pending, quick mount arm accommodates multiple drill patterns ranging from 1-1/2" to 4-7/8". Removal of the door on the quick mount arm enables wiring of the fixture without having to access the driver compartment. A knock-out enables round pole mounting.

Finish
Housing finished in super durable TGIC polyester powder coat paint, 2.5 mil nominal thickness for superior protection against fade and wear. Heat sink is powder coated black. Standard housing colors include black, bronze, grey, white, dark platinum and graphite metallic. RAL and custom color matches available.

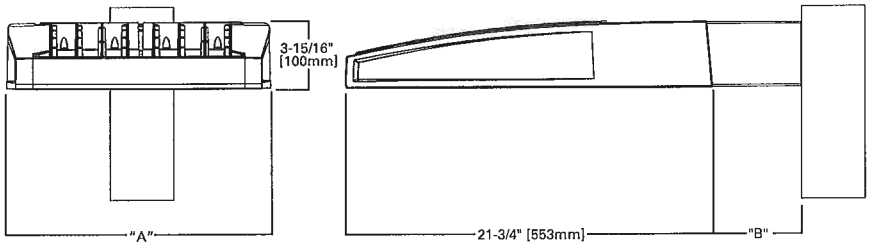
Warranty
Five-year warranty.

GLEON
GALLEON LED

1-10 Light Squares
Solid State LED

AREA/SITE LUMINAIRE

DIMENSIONS



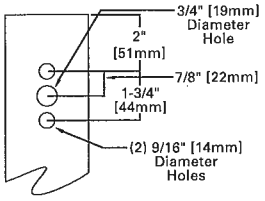
DIMENSION DATA

Number of Light Squares	"A" Width	"B" Standard Arm Length	"B" Optional Arm Length [1]	Weight with Arm (lbs.)	EPA with Arm [2] (Sq. Ft.)
1-4	15-1/2" (394mm)	7" (178mm)	10" (254mm)	33 (15.0 kgs.)	0.96
5-6	21-5/8" (549mm)	7" (178mm)	10" (254mm)	44 (20.0 kgs.)	1.00
7-8	27-5/8" (702mm)	7" (178mm)	13" (330mm)	54 (24.5 kgs.)	1.07
9-10	33-3/4" (857mm)	7" (178mm)	16" (406mm)	63 (28.6 kgs.)	1.12

NOTES: 1. Optional arm length to be used when mounting two fixtures at 90° on a single pole. 2. EPA calculated with optional arm length.

DRILLING PATTERN

TYPE "N"



CERTIFICATION DATA

UL/cUL Wet Location Listed
ISO 9001
LM79 / LM80 Compliant
3G Vibration Rated
IP66 Rated
DesignLights Consortium® Qualified*

ENERGY DATA

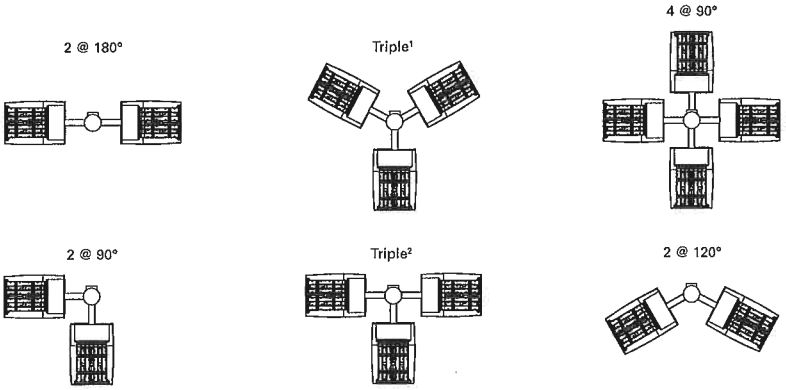
Electronic LED Driver
>0.9 Power Factor
<20% Total Harmonic Distortion
120V-277V 50/60Hz
347V & 480V 60Hz
-40°C Min. Temperature
40°C Max. Temperature
50°C Max. Temperature (HA Option)

*www.designlights.org

TD500020EN
June 21, 2018 4:04 PM

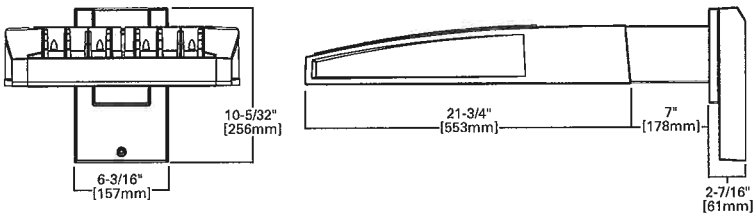
ARM MOUNTING REQUIREMENTS

Configuration	90° Apart	120° Apart
GLEON-AF-01	7" Arm (Standard)	7" Arm (Standard)
GLEON-AF-02	7" Arm (Standard)	7" Arm (Standard)
GLEON-AF-03	7" Arm (Standard)	7" Arm (Standard)
GLEON-AF-04	7" Arm (Standard)	7" Arm (Standard)
GLEON-AF-05	10" Extended Arm (Required)	7" Arm (Standard)
GLEON-AF-06	10" Extended Arm (Required)	7" Arm (Standard)
GLEON-AF-07	13" Extended Arm (Required)	13" Extended Arm (Required)
GLEON-AF-08	13" Extended Arm (Required)	13" Extended Arm (Required)
GLEON-AF-09	16" Extended Arm (Required)	16" Extended Arm (Required)
GLEON-AF-10	16" Extended Arm (Required)	16" Extended Arm (Required)

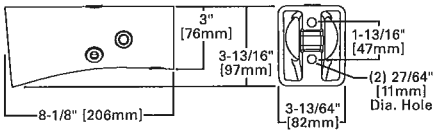


NOTES: 1 Round poles are 3 @ 120°. Square poles are 3 @ 90°. **2** Round poles are 3 @ 90°.

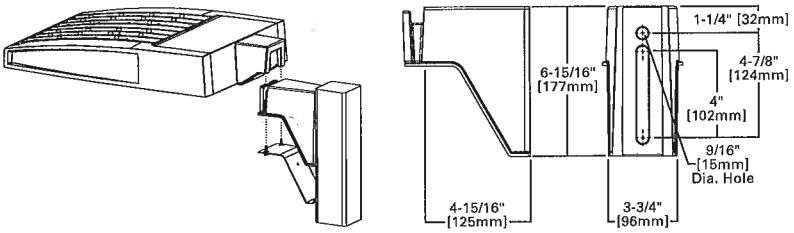
STANDARD WALL MOUNT

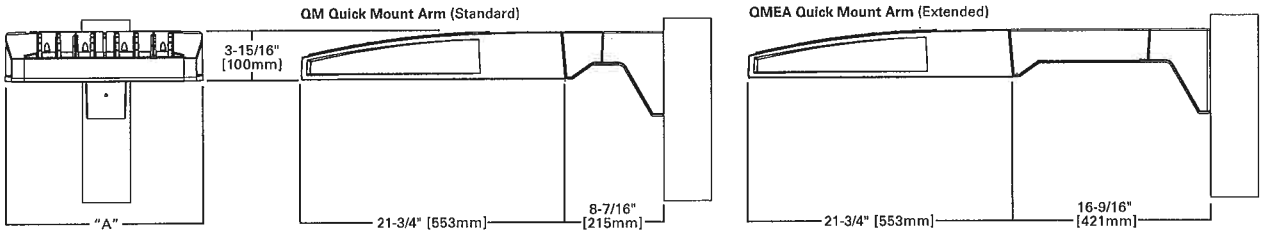


MAST ARM MOUNT



QUICK MOUNT ARM (INCLUDES FIXTURE ADAPTER)



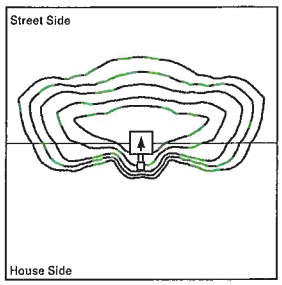


QUICK MOUNT ARM DATA

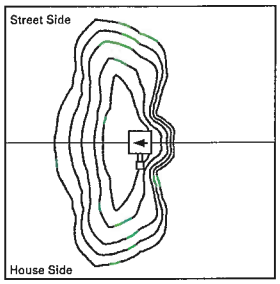
Number of Light Squares [1,2]	"A" Width	Weight with QM Arm (lbs.)	Weight with QMEA Arm (lbs.)	EPA (Sq. Ft.)
1-4	15-1/2" (394mm)	35 (15.91 kgs.)	38 (17.27 kgs.)	1.11
5-6 [3]	21-5/8" (549mm)	46 (20.91 kgs.)	49 (22.27 kgs.)	
7-8	27-5/8" (702mm)	56 (25.45 kgs.)	59 (26.82 kgs.)	

NOTES: 1 QM option available with 1-8 light square configurations. **2** QMEA option available with 1-6 light square configurations. **3** QMEA arm to be used when mounting two fixtures at 90° on a single pole.

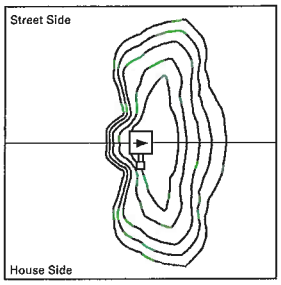
OPTIC ORIENTATION



Standard



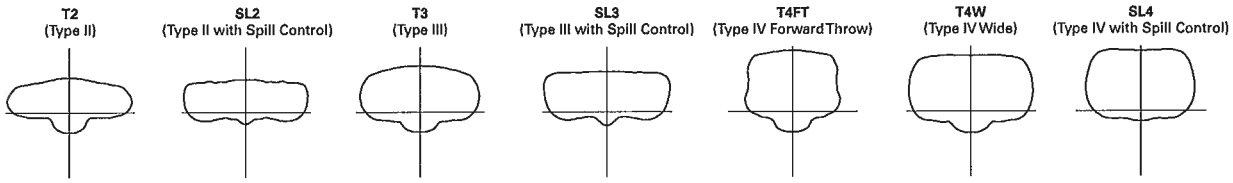
Optics Rotated Left @ 90° [L90]



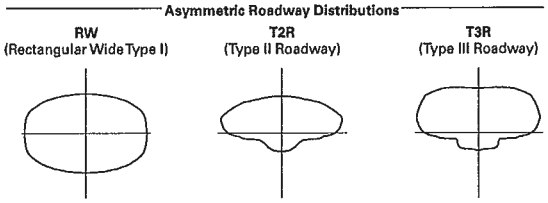
Optics Rotated Right @ 90° [R90]

OPTICAL DISTRIBUTIONS

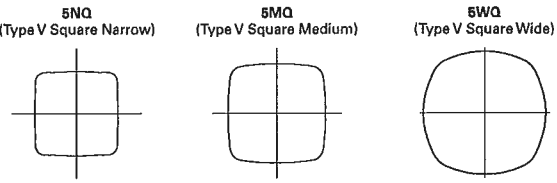
Asymmetric Area Distributions



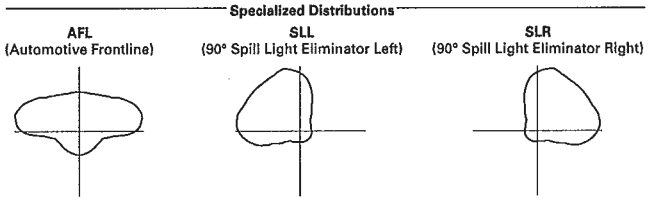
Asymmetric Roadway Distributions



Symmetric Distributions

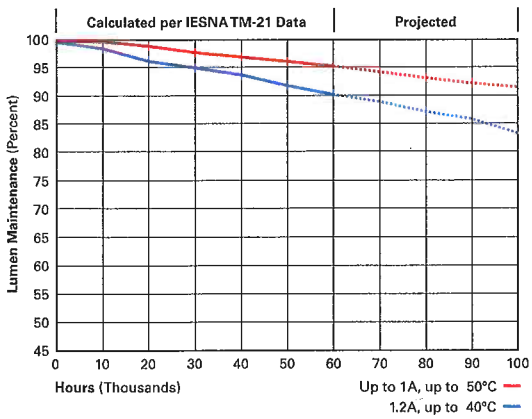


Specialized Distributions



LUMEN MAINTENANCE

Drive Current	Ambient Temperature	TM-21 Lumen Maintenance (60,000 Hours)	Projected L70 (Hours)
Up to 1A	Up to 50°C	> 95%	416,000
1.2A	Up to 40°C	> 90%	205,000



LUMEN MULTIPLIER

Ambient Temperature	Lumen Multiplier
0°C	1.02
10°C	1.01
25°C	1.00
40°C	0.99
50°C	0.97

Powering Business Worldwide

Eaton
1121 Highway 74 South
Peachtree City, GA 30269
P: 770-486-4800
www.eaton.com/lighting

Specifications and dimensions subject to change without notice.

NOMINAL POWER LUMENS (1.2A)

Number of Light Squares		1	2	3	4	5	6	7	8	9	10
Nominal Power (Watts)		67	129	191	258	320	382	448	511	575	640
Input Current @ 120V (A)		0.58	1.16	1.78	2.31	2.94	3.56	4.09	4.71	5.34	5.87
Input Current @ 208V (A)		0.33	0.63	0.93	1.27	1.57	1.87	2.22	2.52	2.8	3.14
Input Current @ 240V (A)		0.29	0.55	0.80	1.10	1.35	1.61	1.93	2.18	2.41	2.71
Input Current @ 277V (A)		0.25	0.48	0.70	0.96	1.18	1.39	1.69	1.90	2.09	2.36
Input Current @ 347V (A)		0.20	0.39	0.57	0.78	0.96	1.15	1.36	1.54	1.72	1.92
Input Current @ 480V (A)		0.15	0.30	0.43	0.60	0.73	0.85	1.03	1.16	1.28	1.45
Optics											
T2	4000K/5000K Lumens	6,709	13,111	19,562	25,848	32,026	38,325	45,324	51,355	57,286	63,424
	3000K Lumens	5,939	11,606	17,316	22,881	28,349	33,925	40,121	45,459	50,710	56,143
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
T2R	4000K/5000K Lumens	7,122	13,919	20,769	27,442	34,000	40,687	48,117	54,519	60,816	67,333
	3000K Lumens	5,939	11,606	17,316	22,881	28,349	33,925	40,121	45,459	50,710	56,143
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
T3	4000K/5000K Lumens	6,838	13,363	19,939	26,346	32,642	39,062	46,196	52,343	58,388	64,646
	3000K Lumens	6,053	11,829	17,650	23,321	28,895	34,578	40,893	46,334	51,685	57,225
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
T3R	4000K/5000K Lumens	6,990	13,660	20,382	26,931	33,368	39,930	47,223	53,506	59,686	66,081
	3000K Lumens	6,188	12,092	18,042	23,839	29,537	35,346	41,802	47,364	52,834	58,495
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
T4FT	4000K/5000K Lumens	6,878	13,440	20,055	26,499	32,832	39,289	46,464	52,646	58,726	65,020
	3000K Lumens	6,088	11,897	17,753	23,457	29,063	34,779	41,130	46,602	51,984	57,556
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
T4W	4000K/5000K Lumens	6,789	13,267	19,795	26,156	32,408	38,781	45,864	51,967	57,968	64,180
	3000K Lumens	6,010	11,744	17,523	23,153	28,688	34,329	40,599	46,001	51,313	56,812
	BUG Rating	B1-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
SL2	4000K/5000K Lumens	6,697	13,088	19,529	25,804	31,970	38,259	45,245	51,267	57,186	63,315
	3000K Lumens	5,928	11,585	17,287	22,842	28,300	33,867	40,051	45,382	50,621	56,046
	BUG Rating	B1-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
SL3	4000K/5000K Lumens	6,837	13,361	19,936	26,342	32,639	39,057	46,189	52,336	58,380	64,636
	3000K Lumens	6,052	11,827	17,647	23,318	28,892	34,573	40,887	46,328	51,678	57,216
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
SL4	4000K/5000K Lumens	6,496	12,695	18,943	25,029	31,011	37,110	43,886	49,727	55,470	61,414
	3000K Lumens	5,750	11,238	16,768	22,156	27,451	32,850	38,848	44,018	49,102	54,364
	BUG Rating	B1-U0-G2	B1-U0-G3	B2-U0-G4	B2-U0-G4	B2-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
5NQ	4000K/5000K Lumens	7,052	13,781	20,564	27,171	33,664	40,285	47,641	53,981	60,215	66,669
	3000K Lumens	6,242	12,199	18,203	24,052	29,799	35,660	42,172	47,784	53,302	59,015
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4
5MQ	4000K/5000K Lumens	7,182	14,034	20,942	27,671	34,284	41,027	48,518	54,975	61,323	67,896
	3000K Lumens	6,358	12,423	18,538	24,494	30,348	36,317	42,948	48,664	54,283	60,102
	BUG Rating	B3-U0-G1	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5	B5-U0-G5
5WQ	4000K/5000K Lumens	7,201	14,073	20,998	27,744	34,375	41,136	48,648	55,121	61,487	68,077
	3000K Lumens	6,374	12,457	18,587	24,559	30,429	36,414	43,063	48,793	54,428	60,262
	BUG Rating	B3-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5	B5-U0-G5	B5-U0-G5
SLL/SLR	4000K/5000K Lumens	6,009	11,741	17,519	23,148	28,681	34,321	40,589	45,990	51,301	56,798
	3000K Lumens	5,319	10,393	15,508	20,491	25,388	30,381	35,929	40,710	45,412	50,278
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5
RW	4000K/5000K Lumens	6,989	13,657	20,378	26,925	33,360	39,921	47,211	53,494	59,672	66,066
	3000K Lumens	6,187	12,089	18,039	23,834	29,530	35,338	41,791	47,353	52,822	58,482
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G4
AFL	4000K/5000K Lumens	7,014	13,706	20,452	27,023	33,481	40,066	47,383	53,688	59,888	66,306
	3000K Lumens	6,209	12,133	18,104	23,921	29,637	35,466	41,943	47,525	53,013	58,694
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G4	B4-U0-G4	B4-U0-G4

* Nominal data for 70 CRI.

NOMINAL POWER LUMENS (1A)

Number of Light Squares		1	2	3	4	5	6	7	8	9	10
Nominal Power (Watts)		59	113	166	225	279	333	391	445	501	558
Input Current @ 120V (A)		0.51	1.02	1.53	2.03	2.55	3.06	3.56	4.08	4.6	5.07
Input Current @ 208V (A)		0.29	0.56	0.82	1.11	1.37	1.64	1.93	2.19	2.46	2.75
Input Current @ 240V (A)		0.26	0.48	0.71	0.96	1.19	1.41	1.67	1.89	2.12	2.39
Input Current @ 277V (A)		0.23	0.42	0.61	0.83	1.03	1.23	1.45	1.65	1.84	2.09
Input Current @ 347V (A)		0.17	0.32	0.50	0.64	0.82	1.00	1.14	1.32	1.50	1.68
Input Current @ 480V (A)		0.14	0.24	0.37	0.48	0.61	0.75	0.91	0.99	1.12	1.28
Optics											
T2	4000K/5000K Lumens	6,116	11,951	17,833	23,563	29,195	34,937	41,317	46,814	52,221	57,817
	3000K Lumens	5,414	10,579	15,786	20,858	25,843	30,926	36,574	41,440	46,226	51,180
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
T2R	4000K/5000K Lumens	6,493	12,688	18,932	25,015	30,994	37,090	43,863	49,699	55,439	61,380
	3000K Lumens	5,748	11,231	16,759	22,143	27,436	32,832	38,828	43,994	49,075	54,334
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5
T3	4000K/5000K Lumens	6,234	12,181	18,176	24,017	29,756	35,609	42,111	47,715	53,225	58,930
	3000K Lumens	5,518	10,783	16,089	21,260	26,340	31,521	37,277	42,237	47,115	52,165
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
T3R	4000K/5000K Lumens	6,372	12,453	18,580	24,550	30,418	36,400	43,048	48,776	54,409	60,239
	3000K Lumens	5,640	11,023	16,447	21,732	26,926	32,221	38,106	43,177	48,163	53,324
	BUG Rating	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5
T4FT	4000K/5000K Lumens	6,270	12,252	18,282	24,156	29,929	35,815	42,356	47,992	53,534	59,271
	3000K Lumens	5,550	10,845	16,183	21,383	26,493	31,703	37,494	42,483	47,388	52,467
	BUG Rating	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
T4W	4000K/5000K Lumens	6,189	12,094	18,045	23,844	29,543	35,352	41,809	47,372	52,843	58,506
	3000K Lumens	5,479	10,706	15,973	21,107	26,151	31,294	37,009	41,934	46,777	51,790
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
SL2	4000K/5000K Lumens	6,105	11,931	17,803	23,522	29,144	34,877	41,245	46,734	52,130	57,717
	3000K Lumens	5,404	10,561	15,759	20,822	25,798	30,873	36,510	41,369	46,145	51,091
	BUG Rating	B1-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
SL3	4000K/5000K Lumens	6,233	12,180	18,174	24,013	29,753	35,604	42,106	47,708	53,218	58,921
	3000K Lumens	5,517	10,782	16,088	21,256	26,337	31,517	37,272	42,231	47,109	52,157
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
SL4	4000K/5000K Lumens	5,922	11,572	17,268	22,816	28,269	33,829	40,006	45,330	50,566	55,984
	3000K Lumens	5,242	10,244	15,286	20,197	25,024	29,945	35,413	40,126	44,761	49,557
	BUG Rating	B1-U0-G2	B1-U0-G3	B2-U0-G3	B2-U0-G4	B2-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
5NQ	4000K/5000K Lumens	6,429	12,563	18,746	24,768	30,688	36,723	43,429	49,208	54,891	60,775
	3000K Lumens	5,691	11,121	16,594	21,925	27,165	32,507	38,443	43,559	48,590	53,798
	BUG Rating	B2-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4
5MQ	4000K/5000K Lumens	6,547	12,794	19,090	25,224	31,253	37,400	44,228	50,114	55,902	61,893
	3000K Lumens	5,795	11,325	16,898	22,328	27,665	33,106	39,151	44,361	49,484	54,788
	BUG Rating	B3-U0-G1	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5
5WQ	4000K/5000K Lumens	6,564	12,828	19,141	25,291	31,336	37,499	44,347	50,248	56,051	62,058
	3000K Lumens	5,810	11,355	16,944	22,388	27,739	33,194	39,256	44,480	49,616	54,934
	BUG Rating	B3-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5	B5-U0-G5	B5-U0-G5
SLL/SLR	4000K/5000K Lumens	5,478	10,703	15,970	21,102	26,145	31,286	37,001	41,924	46,765	51,777
	3000K Lumens	4,849	9,474	14,137	18,679	23,144	27,694	32,753	37,111	41,396	45,833
	BUG Rating	B1-U0-G2	B1-U0-G3	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
RW	4000K/5000K Lumens	6,371	12,449	18,576	24,544	30,411	36,392	43,037	48,764	54,396	60,225
	3000K Lumens	5,640	11,020	16,443	21,726	26,920	32,214	38,096	43,166	48,151	53,311
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4
AFL	4000K/5000K Lumens	6,394	12,494	18,644	24,634	30,521	36,524	43,194	48,942	54,593	60,444
	3000K Lumens	5,660	11,060	16,504	21,806	27,017	32,331	38,235	43,323	48,326	53,505
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3	B4-U0-G4	B4-U0-G4

* Nominal data for 70 CRI.

NOMINAL POWER LUMENS (800MA)

Number of Light Squares		1	2	3	4	5	6	7	8	9	10
Nominal Power (Watts)		44	85	124	171	210	249	295	334	374	419
Input Current @ 120V (A)		0.39	0.77	1.13	1.54	1.90	2.26	2.67	3.03	3.39	3.80
Input Current @ 208V (A)		0.22	0.44	0.62	0.88	1.06	1.24	1.50	1.68	1.87	2.12
Input Current @ 240V (A)		0.19	0.38	0.54	0.76	0.92	1.08	1.30	1.46	1.62	1.84
Input Current @ 277V (A)		0.17	0.36	0.47	0.72	0.83	0.95	1.19	1.31	1.42	1.67
Input Current @ 347V (A)		0.15	0.24	0.38	0.49	0.63	0.77	0.87	1.01	1.15	1.52
Input Current @ 480V (A)		0.11	0.18	0.29	0.37	0.48	0.59	0.66	0.77	0.88	0.96
Optics											
T2	4000K/5000K Lumens	4,941	9,656	14,408	19,038	23,588	28,227	33,382	37,823	42,191	46,713
	3000K Lumens	4,374	8,547	12,754	16,852	20,880	24,987	29,550	33,481	37,347	41,350
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B4-U0-G5	B4-U0-G5
T2R	4000K/5000K Lumens	5,246	10,251	15,296	20,211	25,041	29,966	35,439	40,154	44,791	49,592
	3000K Lumens	4,644	9,074	13,540	17,891	22,166	26,526	31,371	35,544	39,649	43,899
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5
T3	4000K/5000K Lumens	5,037	9,842	14,685	19,404	24,041	28,770	34,024	38,551	43,003	47,612
	3000K Lumens	4,459	8,712	12,999	17,176	21,281	25,467	30,118	34,125	38,066	42,146
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5
T3R	4000K/5000K Lumens	5,148	10,061	15,011	19,835	24,576	29,409	34,780	39,408	43,959	48,669
	3000K Lumens	4,557	8,906	13,288	17,558	21,755	26,033	30,787	34,884	38,913	43,082
	BUG Rating	B1-U0-G2	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
T4FT	4000K/5000K Lumens	5,066	9,899	14,770	19,516	24,181	28,936	34,221	38,774	43,252	47,888
	3000K Lumens	4,484	8,763	13,074	17,276	21,405	25,614	30,292	34,323	38,287	42,390
	BUG Rating	B1-U0-G2	B1-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
T4W	4000K/5000K Lumens	5,000	9,771	14,579	19,264	23,869	28,562	33,779	38,274	42,694	47,269
	3000K Lumens	4,426	8,649	12,905	17,052	21,129	25,283	29,901	33,880	37,793	41,843
	BUG Rating	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
SL2	4000K/5000K Lumens	4,933	9,639	14,383	19,005	23,547	28,178	33,324	37,758	42,118	46,632
	3000K Lumens	4,367	8,532	12,732	16,823	20,844	24,943	29,498	33,423	37,283	41,279
	BUG Rating	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5
SL3	4000K/5000K Lumens	5,036	9,841	14,683	19,401	24,039	28,766	34,019	38,546	42,997	47,605
	3000K Lumens	4,458	8,711	12,997	17,174	21,279	25,464	30,114	34,121	38,061	42,140
	BUG Rating	B1-U0-G2	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
SL4	4000K/5000K Lumens	4,784	9,350	13,951	18,434	22,840	27,332	32,323	36,624	40,854	45,232
	3000K Lumens	4,235	8,277	12,349	16,318	20,218	24,194	28,612	32,420	36,164	40,039
	BUG Rating	B1-U0-G2	B1-U0-G3	B1-U0-G3	B2-U0-G4	B2-U0-G4	B2-U0-G5	B2-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
5NQ	4000K/5000K Lumens	5,194	10,150	15,145	20,011	24,794	29,670	35,088	39,757	44,349	49,102
	3000K Lumens	4,598	8,985	13,406	17,714	21,948	26,264	31,060	35,193	39,258	43,465
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G3
5MQ	4000K/5000K Lumens	5,290	10,337	15,424	20,380	25,250	30,217	35,734	40,489	45,165	50,006
	3000K Lumens	4,683	9,150	13,653	18,040	22,351	26,748	31,632	35,841	39,980	44,265
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G4
5WQ	4000K/5000K Lumens	5,304	10,365	15,465	20,434	25,318	30,297	35,830	40,597	45,286	50,139
	3000K Lumens	4,695	9,175	13,690	18,088	22,411	26,819	31,717	35,936	40,087	44,383
	BUG Rating	B3-U0-G1	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5
SLL/SLR	4000K/5000K Lumens	4,426	8,648	12,903	17,049	21,124	25,278	29,894	33,872	37,784	41,832
	3000K Lumens	3,918	7,655	11,422	15,092	18,699	22,376	26,462	29,983	33,446	37,030
	BUG Rating	B1-U0-G2	B1-U0-G2	B2-U0-G3	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
RW	4000K/5000K Lumens	5,147	10,058	15,009	19,830	24,570	29,402	34,771	39,399	43,949	48,658
	3000K Lumens	4,556	8,903	13,286	17,554	21,749	26,027	30,779	34,876	38,904	43,072
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G4
AFL	4000K/5000K Lumens	5,166	10,095	15,063	19,903	24,659	29,509	34,898	39,542	44,108	48,835
	3000K Lumens	4,573	8,936	13,334	17,618	21,828	26,121	30,892	35,003	39,044	43,229
	BUG Rating	B1-U0-G1	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3

* Nominal data for 70 CRI.

NOMINAL POWER LUMENS (600MA)

Number of Light Squares		1	2	3	4	5	6	7	8	9	10
Nominal Power (Watts)		34	66	96	129	162	193	226	257	290	323
Input Current @ 120V (A)		0.30	0.58	0.86	1.16	1.44	1.73	2.03	2.33	2.59	2.89
Input Current @ 208V (A)		0.17	0.34	0.49	0.65	0.84	0.99	1.14	1.30	1.48	1.63
Input Current @ 240V (A)		0.15	0.30	0.43	0.56	0.74	0.87	1.00	1.13	1.30	1.43
Input Current @ 277V (A)		0.14	0.28	0.41	0.52	0.69	0.81	0.93	1.04	1.22	1.33
Input Current @ 347V (A)		0.11	0.19	0.30	0.39	0.49	0.60	0.69	0.77	0.90	0.99
Input Current @ 480V (A)		0.08	0.15	0.24	0.30	0.38	0.48	0.53	0.59	0.71	0.77
Optics											
T2	4000K/5000K Lumens	4,029	7,874	11,749	15,525	19,235	23,019	27,222	30,844	34,406	38,093
	3000K Lumens	3,566	6,970	10,400	13,743	17,027	20,376	24,097	27,303	30,456	33,720
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G4
T2R	4000K/5000K Lumens	4,278	8,360	12,474	16,482	20,421	24,437	28,900	32,745	36,527	40,441
	3000K Lumens	3,787	7,400	11,042	14,590	18,077	21,632	25,582	28,986	32,334	35,798
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4
T3	4000K/5000K Lumens	4,107	8,026	11,976	15,824	19,605	23,461	27,746	31,438	35,068	38,827
	3000K Lumens	3,636	7,105	10,601	14,007	17,354	20,768	24,561	27,829	31,042	34,370
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
T3R	4000K/5000K Lumens	4,198	8,205	12,242	16,175	20,041	23,982	28,363	32,137	35,848	39,689
	3000K Lumens	3,716	7,263	10,837	14,318	17,740	21,229	25,107	28,448	31,733	35,133
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
T4FT	4000K/5000K Lumens	4,131	8,072	12,045	15,915	19,719	23,597	27,907	31,620	35,272	39,052
	3000K Lumens	3,657	7,145	10,662	14,088	17,455	20,888	24,703	27,990	31,223	34,569
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5
T4W	4000K/5000K Lumens	4,077	7,968	11,889	15,710	19,465	23,292	27,546	31,212	34,816	38,547
	3000K Lumens	3,609	7,053	10,524	13,906	17,230	20,618	24,384	27,629	30,819	34,122
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5
SL2	4000K/5000K Lumens	4,022	7,861	11,729	15,498	19,202	22,979	27,175	30,791	34,347	38,028
	3000K Lumens	3,560	6,959	10,383	13,719	16,998	20,341	24,055	27,256	30,404	33,662
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
SL3	4000K/5000K Lumens	4,106	8,025	11,974	15,821	19,603	23,458	27,742	31,433	35,064	38,821
	3000K Lumens	3,635	7,104	10,599	14,005	17,353	20,765	24,557	27,824	31,039	34,364
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G3	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
SL4	4000K/5000K Lumens	3,902	7,624	11,377	15,033	18,626	22,289	26,359	29,867	33,316	36,886
	3000K Lumens	3,454	6,749	10,071	13,307	16,488	19,730	23,333	26,438	29,491	32,651
	BUG Rating	B1-U0-G2	B1-U0-G2	B1-U0-G3	B1-U0-G3	B2-U0-G4	B2-U0-G4	B2-U0-G4	B2-U0-G5	B3-U0-G5	B3-U0-G5
5NQ	4000K/5000K Lumens	4,236	8,277	12,351	16,319	20,219	24,196	28,614	32,422	36,166	40,042
	3000K Lumens	3,750	7,327	10,933	14,446	17,898	21,418	25,328	28,700	32,014	35,445
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G2	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G2	B5-U0-G3	B5-U0-G3
5MQ	4000K/5000K Lumens	4,314	8,429	12,578	16,619	20,591	24,641	29,141	33,019	36,832	40,779
	3000K Lumens	3,819	7,461	11,134	14,711	18,227	21,812	25,796	29,228	32,604	36,098
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4
5WQ	4000K/5000K Lumens	4,325	8,452	12,611	16,664	20,646	24,707	29,219	33,106	36,930	40,888
	3000K Lumens	3,828	7,482	11,163	14,751	18,276	21,871	25,865	29,305	32,690	36,194
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G4
SLL/SLR	4000K/5000K Lumens	3,609	7,052	10,522	13,903	17,226	20,613	24,378	27,622	30,812	34,114
	3000K Lumens	3,195	6,242	9,314	12,307	15,248	18,247	21,579	24,451	27,275	30,198
	BUG Rating	B1-U0-G1	B1-U0-G2	B1-U0-G3	B2-U0-G3	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
RW	4000K/5000K Lumens	4,197	8,202	12,239	16,171	20,036	23,977	28,356	32,129	35,839	39,680
	3000K Lumens	3,715	7,260	10,834	14,315	17,736	21,224	25,101	28,441	31,725	35,125
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3
AFL	4000K/5000K Lumens	4,213	8,232	12,284	16,230	20,109	24,064	28,459	32,246	35,969	39,824
	3000K Lumens	3,729	7,287	10,874	14,367	17,800	21,301	25,192	28,544	31,840	35,252
	BUG Rating	B1-U0-G1	B1-U0-G1	B2-U0-G2	B2-U0-G2	B2-U0-G2	B3-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3

* Nominal data for 70 CRI.

CONTROL OPTIONS

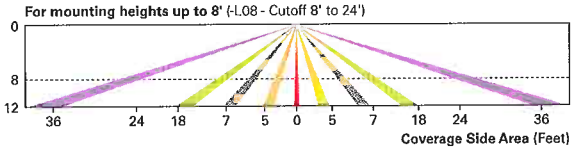
0-10V (DIM)
This fixture is offered standard with 0-10V dimming driver(s). The DIM option provides 0-10V dimming wire leads for use with a lighting control panel or other control method.

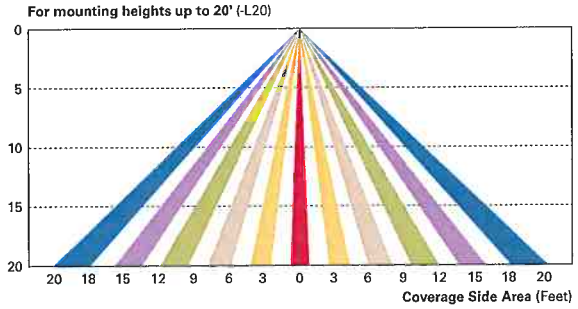
Photocontrol (P, R and PER7)
Optional button-type photocontrol (P) and photocontrol receptacles (R and PER7) provide a flexible solution to enable "dusk-to-dawn" lighting by sensing light levels. Advanced control systems compatible with NEMA 7-pin standards can be utilized with the PER7 receptacle.

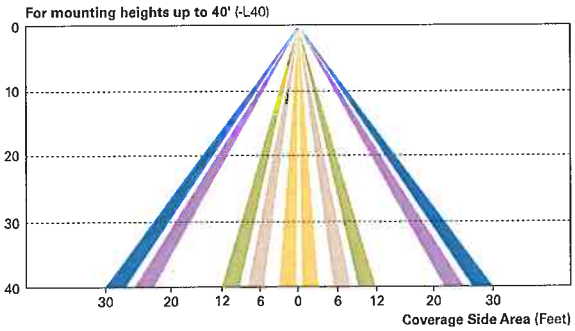
After Hours Dim (AHD)
This feature allows photocontrol-enabled luminaires to achieve additional energy savings by dimming during scheduled portions of the night. The dimming profile will automatically take effect after a "dusk-to-dawn" period has been calculated from the photocontrol input. Specify the desired dimming profile for a simple, factory-shipped dimming solution requiring no external control wiring. Reference the After Hours Dim supplemental guide for additional information.

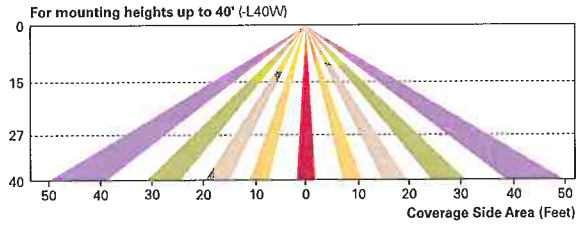
Dimming Occupancy Sensor (MS/DIM-LXX, MS/X-LXX and MS-LXX)
These sensors are factory installed in the luminaire housing. When the MS/DIM-LXX sensor option is selected, the occupancy sensor is connected to a dimming driver and the entire luminaire dims when there is no activity detected. When activity is detected, the luminaire returns to full light output. The MS/DIM sensor is factory preset to dim down to approximately 50 percent power with a time delay of five minutes. The MS-LXX sensor is factory preset to turn the luminaire off after five minutes of no activity. The MS/X-LXX is also preset for five minutes and only controls the specified number of light engines to maintain steady output from the remaining light engines.

These occupancy sensors includes an integral photocell that can be activated with the FSIR-100 accessory for "dusk-to-dawn" control or daylight harvesting - the factory preset is OFF. The FSIR-100 is a wireless tool utilized for changing the dimming level, time delay, sensitivity and other parameters. A variety of sensor lens are available to optimize the coverage pattern for mounting heights from 8'-40'.

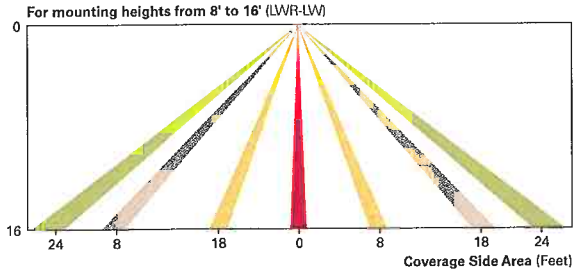


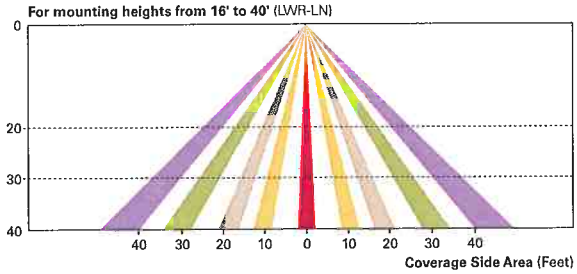






LumaWatt Pro Wireless Control and Monitoring System (LWR-LW and LWR-LN)
The Eaton's LumaWatt Pro powered by Enlighted is a connected lighting solution that combines a broad selection of energy-efficient LED luminaires with a powerful integrated wireless sensor system. The sensor controls the lighting system in compliance with the latest energy codes and collects valuable data about building performance and use. Software applications turn the granular data into information through energy dashboards and specialized apps that make it simple and help optimize the use of building resources, beyond lighting.





WaveLinx Wireless Outdoor Lighting Control Module (WOLC-7P-10A)
The 7-pin wireless outdoor lighting control module enables WaveLinx to control outdoor area, site and flood lighting. WaveLinx controls outdoor lighting using schedules to provide ON, OFF and dimming controls based on astronomic or time schedules based on a 7 day week.

Submitted by LIGHTING ASSOCIATES

LIGHTING ASSOCIATES

Job Name:
(new) SIUE KORTE STADIUM - LIGHT FIXTURES
Architect: BRiC PARTNERSHIP (BELLEVILLE)
Engineer: OATES AND ASSOCIATES (COLLINSVILLE)

Catalog Number:
GLEON-AF-03-LED-480-T4W-BZ-MS/DIM-L40W
Notes:

Type:
A
LAI19-169706

ORDERING INFORMATION

Sample Number: GLEON-AF-04-LED-E1-T3-GM-QM

Product Family [1,2]	Light Engine	Number of Light Squares [3]	Lamp Type	Voltage	Distribution	Color	Mounting
GLEON=Galleon	AF=1A Drive Current	01=1 02=2 03=3 04=4 05=5 [4] 06=6 07=7 [5] 08=8 [5] 09=9 [5] 10=10 [5]	LED=Solid State Light Emitting Diodes	E1=120-277V 347=347V [7] 480=480V [7,8]	T2=Type II T2R=Type II Roadway T3=Type III T3R=Type III Roadway T4FT=Type IV Forward Throw T4W=Type IV Wide 5NQ=Type V Narrow 5MQ=Type V Square Medium 5WQ=Type V Square Wide SL2=Type II w/Spill Control SL3=Type III w/Spill Control SL4=Type IV w/Spill Control SLL=90° Spill Light Eliminator Left SLR=90° Spill Light Eliminator Right RW=Rectangular Wide Type I AFL=Automotive Frontline	AP=Grey BZ=Bronze BK=Black DP=Dark Platinum GM=Graphite Metallic WH=White	[Blank]=Arm for Round or Square Pole EA=Extended Arm [9] MA=Mast Arm Adapter [10] WM=Wall Mount QM=Quick Mount Arm (Standard Length) [11] QMEA=Quick Mount Arm (Extended Length) [12]

Options (Add as Suffix)

7030=70 CRI 3000K [13]
8030=80 CRI 3000K [14]
7050=70 CRI 5000K [13]
7060=70 CRI 6000K [13]
600=Drive Current Factory Set to Nominal 600mA [15]
800=Drive Current Factory Set to Nominal 800mA [15]
1200=Drive Current Factory Set to Nominal 1200mA [15,16]
F=Single Fuse (120, 277 or 347V. Must Specify Voltage)
FF=Double Fuse (208, 240 or 480V. Must Specify Voltage)
2L=Two Circuits [17,18]
DIM=External 0-10V Dimming Leads [19,20]
P=Button Type Photocontrol (120, 208, 240 or 277V. Must Specify Volatage) [21]
PER7=NEMA 7-PIN Twistlock Photocontrol Receptacle [21]
R=NEMA Twistlock Photocontrol Receptacle [21]
AHD145=After Hours Dim, 5 Hours [22]
AHD245=After Hours Dim, 6 Hours [22]
AHD255=After Hours Dim, 7 Hours [22]
AHD355=After Hours Dim, 8 Hours [22]
HA=50°C High Ambient [23]
MS/DIM-L08=Motion Sensor for Dimming Operation, Maximum 8' Mounting Height [24,25]
MS/DIM-L20=Motion Sensor for Dimming Operation, 9' - 20' Mounting Height [24,26]
MS/DIM-L40=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height [22,26]
MS/DIM-L40W=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height (Wide Range) [24,28]
MS/X-L08=Bi-Level Motion Sensor, Maximum 8' Mounting Height [24,25,29]
MS/X-L20=Bi-Level Motion Sensor, 9' - 20' Mounting Height [24,26,29]
MS/X-L40=Bi-Level Motion Sensor, 21' - 40' Mounting Height [22,27,29]
MS/X-L40W=Bi-Level Motion Sensor, 21' - 40' Mounting Height (Wide Range) [24,28,29]
MS-L08=Motion Sensor for ON/OFF Operation, Maximum 8' Mounting Height [24,25]
MS-L20=Motion Sensor for ON/OFF Operation, 9' - 20' Mounting Height [24,26]
MS-L40=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height [24,27]
MS-L40W=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height (Wide Range) [24,28]
LWR-LW=LumaWatt Pro Wireless Sensor, Wide Lens for 8' - 16' Mounting Height [30]
LWR-LN=LumaWatt Pro Wireless Sensor, Narrow Lens for 16' - 40' Mounting Height [30]
L90=Optics Rotated 90° Left
R90=Optics Rotated 90° Right
MT=Factory Installed Mesh Top
TH=Tool-less Door Hardware
LCF=Light Square Trim Plate Painted to Match Housing [31]
HSS=Factory Installed House Side Shield [32]
CE=CE Marking [33]

Accessories (Order Separately)

OA/RA1016=NEMA Photocontrol Multi-Tap - 105-285V
OA/RA1027=NEMA Photocontrol - 480V
OA/RA1201=NEMA Photocontrol - 347V
OA/RA1013=Photocontrol Shorting Cap
OA/RA1014=120V Photocontrol
MA1252=10kV Surge Module Replacement
MA1036-XX=Single Tenon Adapter for 2-3/8" O.D. Tenon
MA1037-XX=2@180° Tenon Adapter for 2-3/8" O.D. Tenon
MA1197-XX=3@120° Tenon Adapter for 2-3/8" O.D. Tenon
MA1188-XX=4@90° Tenon Adapter for 2-3/8" O.D. Tenon
MA1189-XX=2@90° Tenon Adapter for 2-3/8" O.D. Tenon
MA1190-XX=3@90° Tenon Adapter for 2-3/8" O.D. Tenon
MA1191-XX=2@120° Tenon Adapter for 2-3/8" O.D. Tenon
MA1038-XX=Single Tenon Adapter for 3-1/2" O.D. Tenon
MA1039-XX=2@180° Tenon Adapter for 3-1/2" O.D. Tenon
MA1192-XX=3@120° Tenon Adapter for 3-1/2" O.D. Tenon
MA1193-XX=4@90° Tenon Adapter for 3-1/2" O.D. Tenon
MA1194-XX=2@90° Tenon Adapter for 3-1/2" O.D. Tenon
MA1195-XX=3@90° Tenon Adapter for 3-1/2" O.D. Tenon
FSIR-100=Wireless Configuration Tool for Occupancy Sensor [24]
GLEON-MT1=Field Installed Mesh Top for 1-4 Light Squares
GLEON-MT2=Field Installed Mesh Top for 5-6 Light Squares
GLEON-MT3=Field Installed Mesh Top for 7-8 Light Squares
GLEON-MT4=Field Installed Mesh Top for 9-10 Light Squares
GLEON-QM=Quick Mount Arm Kit [10]
GLEON-QMEA=Quick Mount Extended Arm Kit [11]
LS/HSS=Field Installed House Side Shield [32,34]
WOLC-7P-10A=WaveLinx Outdoor Control Module (7-pin) [35]

NOTES:
1. Customer is responsible for engineering analysis to confirm pole and fixture compatibility for all applications. Refer to our white paper WP513001EN for additional support information.
2. DesignLights Consortium® Qualified. Refer to www.designlights.org Qualified Products List under Family Models for details.
3. Standard 4000K CCT and minimum 70 CRI.
4. Not compatible with MS/4-LXX or MS/1-LXX sensors.
5. Not compatible with extended quick mount arm (QMEA).
6. Not compatible with standard quick mount arm (QM) or extended quick mount arm (QMEA).
7. Requires the use of an internal step down transformer when combined with sensor options. Not available with sensor at 1200mA. Not available in combination with the HA high ambient and sensor options at 1A.
8. Only for use with 480V Wye systems. Per NEC, not for use with ungrounded systems, impedance grounded systems or corner grounded systems (commonly known as Three Phase Three Wire Delta, Three Phase High Leg Delta and Three Phase Corner Grounded Delta systems).
9. May be required when two or more luminaires are oriented on a 90° or 120° drilling pattern. Refer to arm mounting requirement table.
10. Factory installed.
11. Maximum 8 light squares.
12. Maximum 6 light squares.
13. Extended lead times apply. Use dedicated IES files for 3000K, 5000K and 6000K when performing layouts. These files are published on the Galleon luminaire product page on the website.
14. Extended lead times apply. Use dedicated IES files for 3000K, 5000K and 6000K when performing layouts. These files are published on the Galleon luminaire product page on the website.
15. 1 Amp standard. Use dedicated IES files for 600mA, 800mA and 1200mA when performing layouts. These files are published on the Galleon luminaire product page on the website.
16. Not available with HA option.
17. 2L is not available with MS, MS/X or MS/DIM at 347V or 480V. 2L in AF-02 through AF-04 requires a larger housing, normally used for AF-05 or AF-06. Extended arm option may be required when mounting two or more fixtures per pole at 90° or 120°. Refer to arm mounting requirement table.
18. Not available with LumaWatt Pro wireless sensors.
19. Cannot be used with other control options.
20. Low voltage control lead brought out 18" outside fixture.
21. Not available if any "MS" sensor is selected. Motion sensor has an integral photocell.
22. Requires the use of P photocontrol or the PER7 or R photocontrol receptacle with photocontrol accessory. See After Hours Dim supplemental guide for additional information.
23. 50°C lumen maintenance data applies to 600mA, 800mA and 1A drive currents.
24. The FSIR-100 configuration tool is required to adjust parameters including high and low modes, sensitivity, time delay, cutoff and more. Consult your lighting representative at Eaton for more information.
25. Approximately 22' detection diameter at 8' mounting height.
26. Approximately 40' detection diameter at 20' mounting height.
27. Approximately 60' detection diameter at 40' mounting height.
28. Approximately 100' detection diameter at 40' mounting height.
29. Replace X with number of Light Squares operating in low output mode.
30. LumaWatt Pro wireless sensors are factory installed only requiring network components LWP-EM-1, LWP-GW-1 and LWP-PoE8 in appropriate quantities. See www.eaton.com/lighting for LumaWatt Pro application information.
31. Not available with house side shield (HSS).
32. Only for use with SL2, SL3, SL4 and AFL distributions. The Light Square trim plate is painted black when the HSS option is selected.
33. CE is not available with the LWR, MS, MS/X, MS/DIM, P, R or PER7 options. Available in 120-277V only.
34. One required for each Light Square.
35. Requires 7-pin NEMA twistlock photocontrol receptacle.

EATON
Powering Business Worldwide

Eaton
1121 Highway 74 South
Peachtree City, GA 30269
P: 770-486-4800
www.eaton.com/lighting

Specifications and dimensions subject to change without notice.

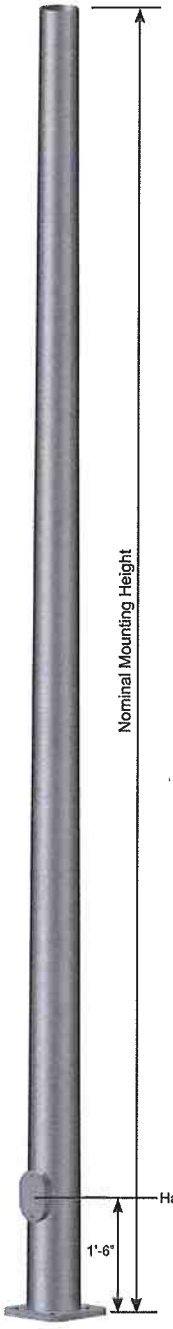
Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE KORTE STADIUM - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES (COLLINSVILLE)	**Catalog Number:** GLEON-AF-03-LED-480-T4W-BZ-MS/DIM-L40W Notes:	**Type:** A LAI19-169706

Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE KORTE STADIUM - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES (COLLINSVILLE)	**Catalog Number:** DS210-850A350-D2-FP-DB-FBC-AB Notes:	**Type:** A LAI19-169706

valmont STRUCTURES

ROUND TAPERED STEEL DS210
Light Duty

Job Name:	Client Name:
Job Location - City: State:	Created By: Date:
Product: Quote:	Customer Approval: Date:



Tenon Top

Pole Cap

Cross Section

Handhole

Full Base Cover (Standard Square)

Dart Square-2T (Optional)

Dart Round - DT (Optional)

SPECIFICATIONS

Pole Shaft - The pole shaft is a 1-piece assembly conforming to ASTM A595 Grade A or A572 Grade 55 with a constant linear taper of 0.14 in/ft.

Pole Top - Pole is provided with either a tenon top or drilled for a fixture mounting. A removable pole cap is provided for drilled poles. Consult the luminaire manufacturer for correct tenon size or drill pattern. Other pole top options include pole cap only (PC) or plain top (PL) which is typical when the pole top diameter matches the necessary slip fit dimensions.

Handhole - A reinforced handhole with grounding provision is provided at 1'-6" from the base end of the pole assembly. Each handhole includes a cover and the cover attachment hardware. Poles with a 5.90" base diameter are supplied with a 3" X 5" rectangular handhole. All other pole assemblies are provided with a 4" X 6.5" ovalized handhole. Handhole dimensions are nominal.

Base Cover - A two-piece full base cover fabricated from ABS plastic is provided with each pole assembly. Valmont reserves the right to provide a two-piece steel full base cover on some applications depending upon the finish requirement and/or pole base diameter. Nut covers can be substituted on most models. Additional base cover options, including the Dart Square (2T) cast aluminum cover and Dart Round (DT) cast aluminum cover, are available upon request.

Anchor Bolts - Anchor bolts conform to ASTM F1554 Grade 55 and are provided with two hex nuts and two flat washers. Bolts have an "L" bend on one end and are galvanized a minimum of 12" on the threaded end.

Hardware - All structural fasteners are galvanized high strength carbon steel. All non-structural fasteners are galvanized or zinc-plated carbon steel or stainless steel.

Finish - Standard finishes are either Galvanized (GV) or Finish Painted (FP). Additional finish options including Finish Paint over Galvanizing (FPGV) or any of the V-PRO™ Finish Coating Systems are available upon request. See the product ordering code for color options.

Design Criteria - Please reference Design Criteria Specification for appropriate design conditions.

Submitted by LIGHTING ASSOCIATES

LIGHTING ASSOCIATES

Job Name:
(new) SIUE KORTE STADIUM - LIGHT FIXTURES
Architect: BRiC PARTNERSHIP (BELLEVILLE)
Engineer: OATES AND ASSOCIATES (COLLINSVILLE)

Catalog Number:
DS210-850A350-D2-FP-DB-FBC-AB

Notes:

Type:
A

LAI19-169706

Poles - Steel | RTS / DS210 | Light Duty

ROUND TAPERED STEEL DS210
Light Duty

valmont STRUCTURES

Job Name: _____ Client Name: _____

Job Location - City: _____ State: _____ Created By: _____ Date: _____

Product: _____ Quote: _____ Customer Approval: _____ Date: _____

DESIGNATION, LOAD AND DIMENSIONAL DATA

DESIGN INFORMATION						POLE DIMENSIONS				DESIGNATION
	80 MPH w/1.3 GUST		90 MPH w/1.3 GUST		100 MPH w/1.3 GUST					
NOMINAL MOUNTING HEIGHT	MAX EPA[1] (SQ.FT)	MAX WEIGHT[1] (LBS)	MAX EPA[1] (SQ.FT)	MAX WEIGHT[1] (LBS)	MAX EPA[1] (SQ.FT)	MAX WEIGHT[1] (LBS)	BASE OD (IN)	TOP OD (IN)	WALL THK (GA)	STRUCTURE WEIGHT[2] (LBS)	
20'-0"	19.3	482	15.1	377	12.2	305	5.90	3.10	11	140	590A200
	24.2	605	19.3	482	15.6	390	6.50	3.70	11	160	650A200
25'-0"	12.5	312	9.9	247	8.0	200	5.90	2.40	11	155	590A250
	20.3	507	16.2	405	13.1	327	7.00	3.50	11	200	700A250
	30.5	760	24.0	625	19.8	495	7.00	3.50	7	280	700E250
30'-0"	11.7	292	9.3	232	7.5	187	6.60	2.40	11	200	660A300
	18.9	473	14.9	373	12.0	300	8.00	3.80	11	265	800A300
	33.5	838	27.0	675	22.0	550	8.00	3.80	7	380	800E300
35'-0"	11.2	280	8.9	222	7.1	177	7.30	2.40	11	250	730A350
	18.9	472	15.1	377	12.2	305	8.50	3.60	11	315	850A350
	23.2	580	18.2	455	14.5	363	9.50	4.60	11	370	950A350
39'-0"	10.7	267	8.5	212	6.6	165	7.82	2.40	11	285	782A389
	17.2	430	13.5	338	10.8	270	9.00	3.58	11	355	900A389
	28.5	715	23.0	575	19.0	475	9.00	3.58	7	515	900E389
45'-0"	17.4	435	13.5	338	10.6	265	10.00	3.70	11	450	T00A450
	28.5	715	23.0	575	19.0	475	10.00	3.70	7	650	T00E450
50'-0"	13.2	330	10.6	265	8.3	208	10.00	3.00	11	475	T00A500
	20.5	512	16.5	412	13.6	340	10.00	3.00	7	680	T00E500

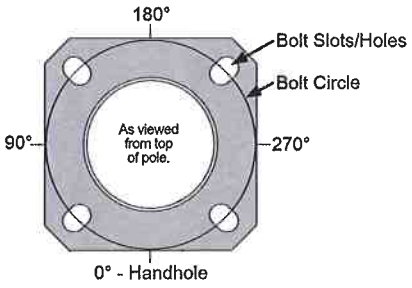
DS210 Heavy Duty poles available at valmontstructures.com

1. Maximum EPA (Effective Projected Area) and weight values are based on top mounted luminaires and/or brackets having a centroid 2'-6" above the Nominal Mounting Height. Variations from sizes above are available upon inquiry at the factory. Satisfactory performance of poles is dependent upon the pole being properly attached to a supporting foundation of adequate design.
2. Structure weight is a nominal value which includes the pole shaft and base plate only.

ANCHORAGE DATA

POLE		BASE PLATE				ANCHOR BOLTS		
		BOLT CIRCLE						
BASE OD (IN)	WALL THK (GA)	DIA (IN)	± (IN)	SQUARE (IN)	THK (IN)	DIA x LENGTH x HOOK (IN)	PROJECTION (IN)	± (IN)
5.90	11	9.00	0.50	10.00	0.875	1.00 x 36.00 x 4.00	4.13	0.25
6.50	11	9.50	0.50	10.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
6.60	11	9.50	0.50	10.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.00	11	10.00	0.50	10.88	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.00	7	10.00	0.50	10.88	1.000	1.00 x 36.00 x 4.00	4.25	0.25
7.30	11	10.50	0.50	11.25	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.82	11	11.00	0.50	11.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
8.00	11	11.00	0.50	11.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
8.00	7	11.00	0.50	11.50	1.250	1.25 x 42.00 x 6.00	5.00	0.25
8.50	11	11.50	0.50	12.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
9.00	11	12.50	0.50	12.38	1.000	1.00 x 36.00 x 4.00	4.25	0.25
9.00	7	12.50	0.50	12.38	1.250	1.25 x 42.00 x 6.00	5.00	0.25
9.50	11	13.00	0.50	13.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
10.00	11	13.50	0.50	14.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
10.00	7	13.50	0.50	14.00	1.250	1.25 x 42.00 x 6.00	5.00	0.25

Anchor Base Detail



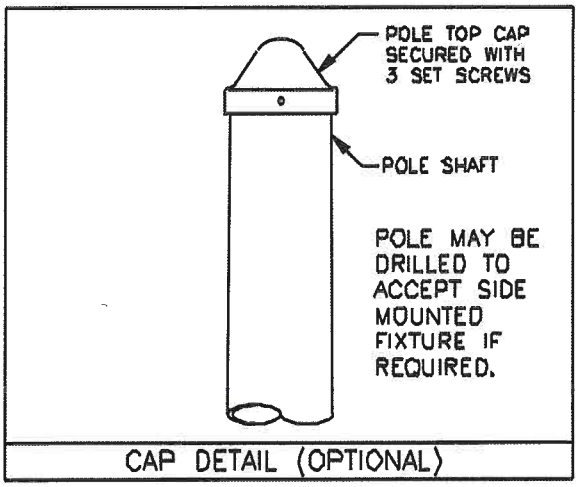
PRODUCT ORDERING CODE

MODEL	DESIGNATION	FIXTURE MOUNTING	FINISH SYSTEM	STANDARD COLOR OPTIONS	BASE COVER	ANCHOR BOLTS	SUPPLEMENTAL INFO
DS210	850A350						
	Select Correct Designation from the *Load and Dimensional Data Chart.*	**Drill Mounting (See Orientation)** D1 = (1) Drilling @ 270° D2 = (2) Drillings @ 90° & 270° D3 = (3) Drillings @ 60°, 180°, & 300° D4 = (4) Drillings @ 0°, 90°, 180°, & 270° D5 = (2) Drillings @ 180° & 270° D6 = (3) Drillings @ 90°, 180°, & 270° **Tenon Mounting** P2 = 2.38" OD x 4" tenon P4 = 4.00" OD x 6" tenon P5 = 2.88" OD x 4" tenon P6 = 2.88" OD x 5" tenon P7 = 2.38" OD x 5" tenon P9 = Special Size (Specify) **Other Options** PC = Pole Cap PL = Plain Top (No Cap)	GV = Galvanized FP = Finish Painted -----OPTIONAL----- FPGV = Finish Paint over Galvanizing VP30 = V-PRO™ 30 System VP32 = V-PRO™ 32 System VP53 = V-PRO™ 53 System VP54 = V-PRO™ 54 System VP57 = V-PRO™ 57 System VP100 = V-PRO™ 100 System VP105 = V-PRO™ 105 System	GV = Galvanized BK = Black DB = Dark Bronze MB = Medium Bronze WH = White LG = Light Gray CB = Bronze DG = Dark Green ST = Sandstone HG = Hunter Green SG = Slate Gray SL = Silver SC = Special Color (Specify)	FBC = Full Base Cover -----OPTIONAL----- NC = Nut Covers 2T = Square Dart Cover DT = Dart Round Cover	AB = With Anchor Bolts LAB = Without Anchor Bolts	

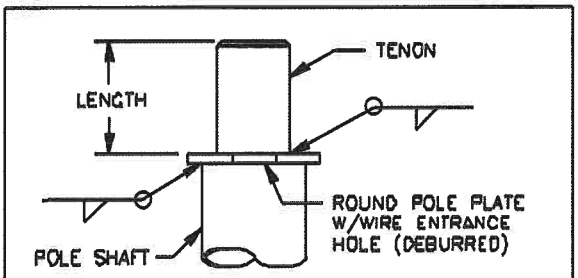
Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE KORTE STADIUM - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES (COLLINSVILLE)	**Catalog Number:** DS210-850A350-D2-FP-DB-FBC-AB Notes:	**Type:** A LAI19-169706

valmont STRUCTURES

DS210 Round Tapered

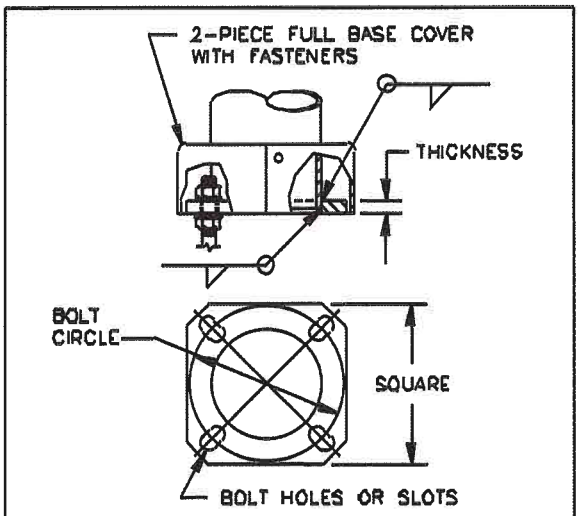


CAP DETAIL (OPTIONAL)

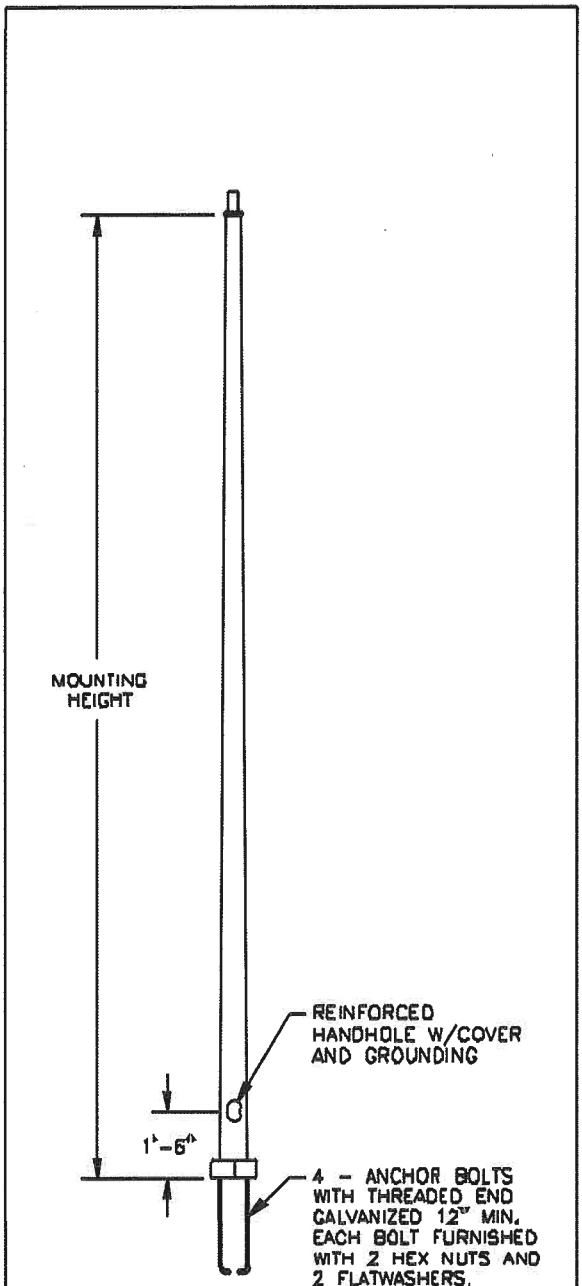


DESIGN NUMBER	O.D. (in)	PIPE SIZE	LENGTH (in)
P2	2.375	2.0" SCHED 80	4
P4	4.000	3.5" SCHED 40	6
PL	2.400	POLE TOP	N.A.

TENON DETAIL (STANDARD)



POLE BASE DETAIL



DS210 POLE DETAIL

SPC7204 02/17 valmontstructures.com carries the most current spec information and supersedes these guidelines.

Submitted by LIGHTING ASSOCIATES

LIGHTING ASSOCIATES

Job Name:
(new) SIUE KORTE STADIUM - LIGHT FIXTURES
Architect: BRiC PARTNERSHIP (BELLEVILLE)
Engineer: OATES AND ASSOCIATES (COLLINSVILLE)

Catalog Number:
GLEON-AF-03-LED-480-T4W-BZ-MS/DIM-L40W
Notes:

Type:
B
LAI19-169706

ORDERING INFORMATION

Sample Number: GLEON-AF-04-LED-E1-T3-GM-QM

Product Family [1,2]	Light Engine	Number of Light Squares [3]	Lamp Type	Voltage	Distribution	Color	Mounting
GLEON=Galleon	AF=1A Drive Current	01=1 02=2 03=3 04=4 05=5 [4] 06=6 07=7 [5] 08=8 [5] 09=9 [6] 10=10 [6]	LED=Solid State Light Emitting Diodes	E1=120-277V 347=347V [7] 480=480V [7,8]	T2=Type II T2R=Type II Roadway T3=Type III T3R=Type III Roadway T4FT=Type IV Forward Throw T4W=Type IV Wide 5NQ=Type V Narrow 5MQ=Type V Square Medium 5WQ=Type V Square Wide SL2=Type II w/Spill Control SL3=Type III w/Spill Control SL4=Type IV w/Spill Control SLL=90° Spill Light Eliminator Left SLR=90° Spill Light Eliminator Right RW=Rectangular Wide Type I AFL=Automotive Frontline	AP=Grey BZ=Bronze BK=Black DP=Dark Platinum GM=Graphite Metallic WH=White	[Blank]=Arm for Round or Square Pole EA=Extended Arm [9] MA=Mast Arm Adapter [10] WM=Wall Mount QM=Quick Mount Arm (Standard Length) [11] QMEA=Quick Mount Arm (Extended Length) [12]

Options (Add as Suffix)	Accessories (Order Separately)
7030=70 CRI 3000K [13] 8030=80 CRI 3000K [14] 7050=70 CRI 5000K [13] 7060=70 CRI 6000K [13] 600=Drive Current Factory Set to Nominal 600mA [15] 800=Drive Current Factory Set to Nominal 800mA [15] 1200=Drive Current Factory Set to Nominal 1200mA [15,16] F=Single Fuse (120, 277 or 347V. Must Specify Voltage) FF=Double Fuse (208, 240 or 480V. Must Specify Voltage) 2L=Two Circuits [17,18] DIM=External 0-10V Dimming Leads [19,20] P=Button Type Photocontrol (120, 208, 240 or 277V. Must Specify Volatage) [21] PER7=NEMA 7-PIN Twistlock Photocontrol Receptacle [21] R=NEMA Twistlock Photocontrol Receptacle [21] AHD145=After Hours Dim, 5 Hours [22] AHD245=After Hours Dim, 6 Hours [22] AHD255=After Hours Dim, 7 Hours [22] AHD355=After Hours Dim, 8 Hours [22] HA=50°C High Ambient [23] MS/DIM-L08=Motion Sensor for Dimming Operation, Maximum 8' Mounting Height [24,25] MS/DIM-L20=Motion Sensor for Dimming Operation, 9' - 20' Mounting Height [24,26] MS/DIM-L40=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height [22,25] MS/DIM-L40W=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height (Wide Range) [24,28] MS/X-L08=Bi-Level Motion Sensor, Maximum 8' Mounting Height [24,26,29] MS/X-L20=Bi-Level Motion Sensor, 9' - 20' Mounting Height [24,26,29] MS/X-L40=Bi-Level Motion Sensor, 21' - 40' Mounting Height [22,27,29] MS/X-L40W=Bi-Level Motion Sensor, 21' - 40' Mounting Height (Wide Range) [24,28,29] MS-L08=Motion Sensor for ON/OFF Operation, Maximum 8' Mounting Height [24,25] MS-L20=Motion Sensor for ON/OFF Operation, 9' - 20' Mounting Height [24,26] MS-L40=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height [24,27] MS-L40W=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height (Wide Range) [24,28] LWR-LW=LumaWatt Pro Wireless Sensor, Wide Lens for 8' - 16' Mounting Height [30] LWR-LN=LumaWatt Pro Wireless Sensor, Narrow Lens for 16' - 40' Mounting Height [30] L90=Optics Rotated 90° Left R90=Optics Rotated 90° Right MT=Factory Installed Mesh Top TH=Tool-less Door Hardware LCF=Light Square Trim Plate Painted to Match Housing [31] HSS=Factory Installed House Side Shield [32] CE=CE Marking [33]	OA/RA1016=NEMA Photocontrol Multi-Tap - 105-285V OA/RA1027=NEMA Photocontrol - 480V OA/RA1201=NEMA Photocontrol - 347V OA/RA1013=Photocontrol Shorting Cap OA/RA1014=120V Photocontrol MA1252=10kV Surge Module Replacement MA1036-XX=Single Tenon Adapter for 2-3/8" O.D. Tenon MA1037-XX=2@180° Tenon Adapter for 2-3/8" O.D. Tenon MA1197-XX=3@120° Tenon Adapter for 2-3/8" O.D. Tenon MA1188-XX=4@90° Tenon Adapter for 2-3/8" O.D. Tenon MA1189-XX=2@90° Tenon Adapter for 2-3/8" O.D. Tenon MA1190-XX=3@90° Tenon Adapter for 2-3/8" O.D. Tenon MA1191-XX=2@120° Tenon Adapter for 2-3/8" O.D. Tenon MA1038-XX=Single Tenon Adapter for 3-1/2" O.D. Tenon MA1039-XX=2@180° Tenon Adapter for 3-1/2" O.D. Tenon MA1192-XX=3@120° Tenon Adapter for 3-1/2" O.D. Tenon MA1193-XX=4@90° Tenon Adapter for 3-1/2" O.D. Tenon MA1194-XX=2@90° Tenon Adapter for 3-1/2" O.D. Tenon MA1195-XX=3@90° Tenon Adapter for 3-1/2" O.D. Tenon FSIR-100=Wireless Configuration Tool for Occupancy Sensor [24] GLEON-MT1=Field Installed Mesh Top for 1-4 Light Squares GLEON-MT2=Field Installed Mesh Top for 5-6 Light Squares GLEON-MT3=Field Installed Mesh Top for 7-8 Light Squares GLEON-MT4=Field Installed Mesh Top for 9-10 Light Squares GLEON-QM=Quick Mount Arm Kit [10] GLEON-QMEA=Quick Mount Extended Arm Kit [11] LS/HSS=Field Installed House Side Shield [32,34] WOLC-7P-10A=WaveLinx Outdoor Control Module (7-pin) [35]

NOTES:
1. Customer is responsible for engineering analysis to confirm pole and fixture compatibility for all applications. Refer to our white paper WP513001EN for additional support information.
2. DesignLights Consortium® Qualified. Refer to www.designlights.org Qualified Products List under Family Models for details.
3. Standard 4000K CCT and minimum 70 CRI.
4. Not compatible with MS/4-LXX or MS/1-LXX sensors.
5. Not compatible with extended quick mount arm (QMEA).
6. Not compatible with standard quick mount arm (QM) or extended quick mount arm (QMEA).
7. Requires the use of an internal step down transformer when combined with sensor options. Not available with sensor at 1200mA. Not available in combination with the HA high ambient and sensor options at 1A.
8. Only for use with 480V Wye systems. Per NEC, not for use with ungrounded systems, impedance grounded systems or corner grounded systems (commonly known as Three Phase Three Wire Delta, Three Phase High Leg Delta and Three Phase Corner Grounded Delta systems).
9. May be required when two or more luminaires are oriented on a 90° or 120° drilling pattern. Refer to arm mounting requirement table.
10. Factory installed.
11. Maximum 8 light squares.
12. Maximum 6 light squares.
13. Extended lead times apply. Use dedicated IES files for 3000K, 5000K and 6000K when performing layouts. These files are published on the Galleon luminaire product page on the website.
14. Extended lead times apply. Use dedicated IES files for 3000K, 5000K and 6000K when performing layouts. These files are published on the Galleon luminaire product page on the website.
15. 1 Amp standard. Use dedicated IES files for 600mA, 800mA and 1200mA when performing layouts. These files are published on the Galleon luminaire product page on the website.
16. Not available with HA option.
17. 2L is not available with MS, MS/X or MS/DIM at 347V or 480V. 2L in AF-02 through AF-04 requires a larger housing, normally used for AF-05 or AF-06. Extended arm option may be required when mounting two or more fixtures per pole at 90° or 120°. Refer to arm mounting requirement table.
18. Not available with LumaWatt Pro wireless sensors.
19. Cannot be used with other control options.
20. Low voltage control lead brought out 18" outside fixture.
21. Not available if any "MS" sensor is selected. Motion sensor has an integral photocell.
22. Requires the use of P photocontrol or the PER7 or R photocontrol receptacle with photocontrol accessory. See After Hours Dim supplemental guide for additional information.
23. 50°C lumen maintenance data applies to 600mA, 800mA and 1A drive currents.
24. The FSIR-100 configuration tool is required to adjust parameters including high and low modes, sensitivity, time delay, cutoff and more. Consult your lighting representative at Eaton for more information.
25. Approximately 22' detection diameter at 8' mounting height.
26. Approximately 40' detection diameter at 20' mounting height.
27. Approximately 60' detection diameter at 40' mounting height.
28. Approximately 100' detection diameter at 40' mounting height.
29. Replace X with number of Light Squares operating in low output mode.
30. LumaWatt Pro wireless sensors are factory installed only requiring network components LWP-EM-1, LWP-GW-1 and LWP-PoE8 in appropriate quantities. See www.eaton.com/lighting for LumaWatt Pro application information.
31. Not available with house side shield (HSS).
32. Only for use with SL2, SL3, SL4 and AFL distributions. The Light Square trim plate is painted black when the HSS option is selected.
33. CE is not available with the LWR, MS, MS/X, MS/DIM, P, R or PER7 options. Available in 120-277V only.
34. One required for each Light Square.
35. Requires 7-pin NEMA twistlock photocontrol receptacle.

EATON
Powering Business Worldwide

Eaton
1121 Highway 74 South
Peachtree City, GA 30269
P: 770-486-4800
www.eaton.com/lighting

Specifications and dimensions subject to change without notice.

Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE KORTE STADIUM - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES (COLLINSVILLE)	**Catalog Number:** GLEON-AF-03-LED-480-T4W-BZ-MS/DIM-L40W Notes:	**Type:** B LAI19-169706

Submitted by LIGHTING ASSOCIATES

LIGHTING ASSOCIATES

Job Name:
(new) SIUE KORTE STADIUM - LIGHT FIXTURES
Architect: BRiC PARTNERSHIP (BELLEVILLE)
Engineer: OATES AND ASSOCIATES (COLLINSVILLE)

Catalog Number:
DS210-850A350-D2-FP-DB-FBC-AB

Notes:

Type:
B

LAI19-169706

Poles - Steel

RTS / DS210

Light Duty

ROUND TAPERED STEEL DS210
Light Duty

valmont STRUCTURES

Job Name: _____ Client Name: _____

Job Location - City: _____ State: _____ Created By: _____ Date: _____

Product: _____ Quote: _____ Customer Approval: _____ Date: _____

DESIGNATION, LOAD AND DIMENSIONAL DATA

DESIGN INFORMATION							POLE DIMENSIONS				DESIGNATION
	80 MPH w/1.3 GUST		90 MPH w/1.3 GUST		100 MPH w/1.3 GUST						
NOMINAL MOUNTING HEIGHT	MAX EPA[1] (SQ.FT)	MAX WEIGHT[1] (LBS)	MAX EPA[1] (SQ.FT)	MAX WEIGHT[1] (LBS)	MAX EPA[1] (SQ.FT)	MAX WEIGHT[1] (LBS)	BASE OD (IN)	TOP OD (IN)	WALL THK (GA)	STRUCTURE WEIGHT[2] (LBS)	
20'-0"	19.3	482	15.1	377	12.2	305	5.90	3.10	11	140	590A200
	24.2	605	19.3	482	15.6	390	6.50	3.70	11	160	650A200
25'-0"	12.5	312	9.9	247	8.0	200	5.90	2.40	11	155	590A250
	20.3	507	16.2	405	13.1	327	7.00	3.50	11	200	700A250
	30.5	760	24.0	625	19.8	495	7.00	3.50	7	280	700E250
30'-0"	11.7	292	9.3	232	7.5	187	6.60	2.40	11	200	660A300
	18.9	473	14.9	373	12.0	300	8.00	3.80	11	265	800A300
	33.5	838	27.0	675	22.0	550	8.00	3.80	7	380	800E300
35'-0"	11.2	280	8.9	222	7.1	177	7.30	2.40	11	250	730A350
	18.9	472	15.1	377	12.2	305	8.50	3.60	11	315	850A350
	23.2	580	18.2	455	14.5	363	9.50	4.60	11	370	950A350
39'-0"	10.7	267	8.5	212	6.6	165	7.82	2.40	11	285	782A389
	17.2	430	13.5	338	10.8	270	9.00	3.58	11	355	900A389
	28.5	715	23.0	575	19.0	475	9.00	3.58	7	515	900E389
45'-0"	17.4	435	13.5	338	10.6	265	10.00	3.70	11	450	T00A450
	28.5	715	23.0	575	19.0	475	10.00	3.70	7	650	T00E450
50'-0"	13.2	330	10.6	265	8.3	208	10.00	3.00	11	475	T00A500
	20.5	512	16.5	412	13.6	340	10.00	3.00	7	680	T00E500

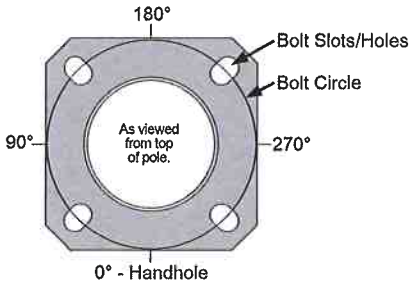
DS210 Heavy Duty poles available at valmontstructures.com

1. Maximum EPA (Effective Projected Area) and weight values are based on top mounted luminaires and/or brackets having a centroid 2'-6" above the Nominal Mounting Height. Variations from sizes above are available upon inquiry at the factory. Satisfactory performance of poles is dependent upon the pole being properly attached to a supporting foundation of adequate design.
2. Structure weight is a nominal value which includes the pole shaft and base plate only.

ANCHORAGE DATA

POLE		BASE PLATE				ANCHOR BOLTS		
		BOLT CIRCLE						
BASE OD (IN)	WALL THK (GA)	DIA (IN)	± (IN)	SQUARE (IN)	THK (IN)	DIA x LENGTH x HOOK (IN)	PROJECTION (IN)	± (IN)
5.90	11	9.00	0.50	10.00	0.875	1.00 x 36.00 x 4.00	4.13	0.25
6.50	11	9.50	0.50	10.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
6.60	11	9.50	0.50	10.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.00	11	10.00	0.50	10.88	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.00	7	10.00	0.50	10.88	1.000	1.00 x 36.00 x 4.00	4.25	0.25
7.30	11	10.50	0.50	11.25	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.82	11	11.00	0.50	11.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
8.00	11	11.00	0.50	11.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
8.00	7	11.00	0.50	11.50	1.250	1.25 x 42.00 x 6.00	5.00	0.25
8.50	11	11.50	0.50	12.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
9.00	11	12.50	0.50	12.38	1.000	1.00 x 36.00 x 4.00	4.25	0.25
9.00	7	12.50	0.50	12.38	1.250	1.25 x 42.00 x 6.00	5.00	0.25
9.50	11	13.00	0.50	13.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
10.00	11	13.50	0.50	14.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
10.00	7	13.50	0.50	14.00	1.250	1.25 x 42.00 x 6.00	5.00	0.25

Anchor Base Detail



PRODUCT ORDERING CODE

MODEL	DESIGNATION	FIXTURE MOUNTING	FINISH SYSTEM	STANDARD COLOR OPTIONS	BASE COVER	ANCHOR BOLTS	SUPPLEMENTAL INFO
DS210	850A350						
	Select Correct Designation from the *Load and Dimensional Data Chart.*	**Drill Mounting (See Orientation)** D1 = (1) Drilling @ 270° D2 = (2) Drillings @ 90° & 270° D3 = (3) Drillings @ 60°, 180°, & 300° D4 = (4) Drillings @ 0°, 90°, 180°, & 270° D5 = (2) Drillings @ 180° & 270° D6 = (3) Drillings @ 90°, 180°, & 270° **Tenon Mounting** P2 = 2.38" OD x 4" tenon P4 = 4.00" OD x 6" tenon P5 = 2.88" OD x 4" tenon P6 = 2.88" OD x 5" tenon P7 = 2.38" OD x 5" tenon P9 = Special Size (Specify) **Other Options** PC = Pole Cap PL = Plain Top (No Cap)	GV = Galvanized FP = Finish Painted -----OPTIONAL----- FPGV = Finish Paint over Galvanizing VP30 = V-PRO™ 30 System VP32 = V-PRO™ 32 System VP53 = V-PRO™ 53 System VP54 = V-PRO™ 54 System VP57 = V-PRO™ 57 System VP100 = V-PRO™ 100 System VP105 = V-PRO™ 105 System	GV = Galvanized BK = Black DB = Dark Bronze MB = Medium Bronze WH = White LG = Light Gray CB = Bronze DG = Dark Green ST = Sandstone HG = Hunter Green SG = Slate Gray SL = Silver SC = Special Color (Specify)	FBC = Full Base Cover -----OPTIONAL----- NC = Nut Covers 2T = Square Dart Cover DT = Dart Round Cover	AB = With Anchor Bolts LAB = Without Anchor Bolts	

Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE KORTE STADIUM - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES (COLLINSVILLE)	**Catalog Number:** DS210-850A350-D2-FP-DB-FBC-AB Notes:	**Type:** **B** LAI19-169706

Submitted by LIGHTING ASSOCIATES

Job Name:
(new) SIUE KORTE STADIUM - LIGHT FIXTURES
Architect: BRiC PARTNERSHIP (BELLEVILLE)
Engineer: OATES AND ASSOCIATES (COLLINSVILLE)

Catalog Number:
FSIR-100-PK

Notes:

Type:
TOOL

LAI19-169706

WATTSTOPPER

FIXTURE SENSORS & CONTROLS | ACCESSORIES

legrand®

WIRELESS HANDHELD CONFIGURATION TOOL

FSIR-100

Description

The FSIR-100 Wireless IR Configuration Tool is a handheld tool for remote configuration of IR-enabled fixture integrated sensors. The tool enables device modifications via pushbutton, without ladders or tools, and stores up to six sensor parameter profiles to speed configuration of multiple sensors.

Operation

Powered by three AAA batteries, the FSIR-100 features an easy-to-read organic LED (OLED) screen and bi-directional communication with IR-enabled fixture sensors. Its intuitive navigation pad provides a familiar interface for users who can see the current control parameters and make changes by navigating through simple menus. Adjustable sensor parameters include high and low modes, sensitivity, time delay, cut off and more. The FSIR-100 is also used to initiate automatic calibration of the ambient light level setpoint. The setpoint is used to hold the controlled lighting off or at low level when there is sufficient daylight.

IR Communication

The FSIR-100 uses bidirectional IR communication to send and receive sensor settings at mounting heights up to 40 feet. The device can display previously established sensor parameters, copy parameters and send new parameters or stored parameter profiles. For projects where identical settings may be desired across a large number of areas or spaces, this capability provides a streamlined method of configuration. Settings can be copied throughout a site, or in different sites.

Applications

Installers and end users can use the FSIR-100 for initial setup and subsequent sensor adjustement to ensure conformity with design intent. It simplifies changes to sensor settings by making the adjustment process ladder-free. It is compatible with IR-enabled Wattstopper HBP and FSP sensors. These products are ideal for use in parking facilites, gas station, pedestrian pathways and warehouse.

Features

- Establishes high and low mode light levels for 0-10V control
- Sets time delay, cut off time and sensitivity for motion detection
- Enables light level settings for either hold off control or daylighting control
- Initiates automatic setpoint configuration
- Allows ramp up and fade down rate adjustments
- Locks sensor settings to prevent unauthorized changes
- This product meets the materials restrictions of RoHS

PROJECT		LOCATION/ TYPE	

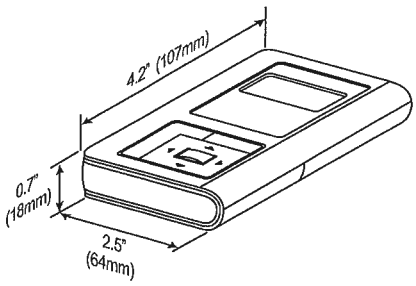
WWW.LEGRAND.US/WATTSTOPPER

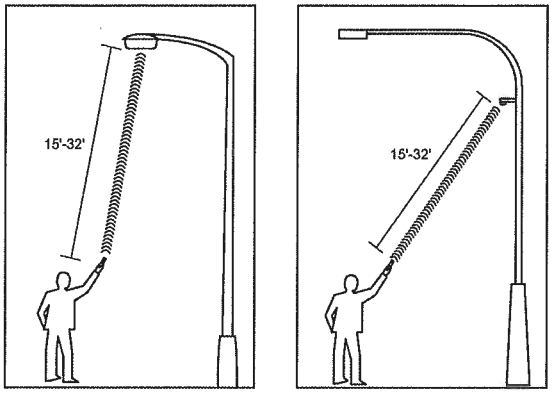
legrand

Specifications

- Three AAA 1.5 volt batteries (included)
- OLED display 1.4"W x .75"H (36mm x 19mm)
- Infrared (IR) transceiver (36kHz frequency)
- IR range: up to 32' (10m)
- Includes carrying case with belt clip
- Operating temperature: 0-104°F (0-40°C)
- FCC part 15 compliant
- TUV EMC compliant
- Five year warranty

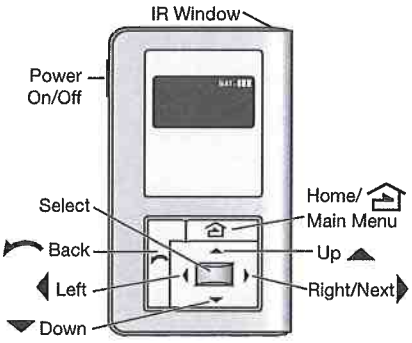
Dimensions & IR Coverage

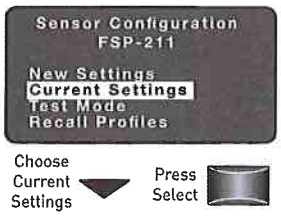




* Distance may vary depending on the lighting environment

Controls & Menus

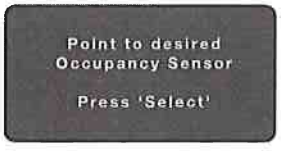




Choose Current Settings

Press Select

Press Select to View More Settings



Point and Press Select

Typical FSIR-100 screens. Complete menu and navigation information is available in the FSIR-100 User Guide.

Ordering Information

Catalog #	Description
☐ FSIR-100	Wireless Handheld Configuration Tool

LIGHTING ASSOCIATES
3216 S. BRENTWOOD BLVD.
WEBSTER GROVES MO 63119
Phone: (314) 531-3500
Fax: (314) 531-3737

Date: Apr 18, 2019

Job Name
(new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES
LAI19-169707
EDWARDSVILLE IL

Bid Date
Apr 9, 2019

Submittal Date
Apr 16, 2019

Architect:
BRiC PARTNERSHIP
100 EAST WASHINGTON
BELLEVILLE IL 62220

Engineer:
OATES AND ASSOCIATES
100 LANTER COURT, SUITE 1
COLLINSVILLE IL

Date: Apr 18, 2019

Transmittal

LIGHTING ASSOCIATES
3216 S. BRENTWOOD BLVD.
WEBSTER GROVES MO 63119
Phone: (314) 531-3500
From: Tyler Woldridge

Project **(new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES**
Quote# LAI19-169707
Location EDWARDSVILLE IL
Contact:

ATTACHED WE ARE SENDING YOU 1 COPY OF THE FOLLOWING ITEM:

☐ Drawings ☐ Specifications Other:
☐ Prints ☐ Information
☐ Plans ☐ Submittals

THESE ARE TRANSMITTED FOR:

☐ Prior Approval ☐ Resubmittal for Approval ☐ Record
☐ Approval ☐ Corrections Bids due on:
☐ Approval as Submitted ☐ Your Use Other:
☐ Approval as Noted ☐ Review and Comment

Qty	Type	MFG	Part
~~8~~ 9	A	MCGRAW	GLEON-AF-03-LED-480-T4W-BZ-MS/ DIM-L40W
WHB ~~8~~ 9	A	VALMONT INDUSTRIES, INC.	DS210-850A350-D2-FP-DB-FBC-AB
46	B	MCGRAW	GLEON-AF-03-LED-480-T4W-BZ-MS/ DIM-L40W
23	B	VALMONT INDUSTRIES, INC.	DS210-850A350-D2-FP-DB-FBC-AB
1	C	MCGRAW	GLEON-AF-03-LED-E1-T4W-BZ-MS/ DIM-L40W
1	C	VALMONT INDUSTRIES, INC.	DS210-850A350-D2-FP-DB-FBC-AB
2	D	MCGRAW	GLEON-AF-03-LED-E1-T4W-BZ-MS/ DIM-L40W
1	D	VALMONT INDUSTRIES, INC.	DS210-850A350-D2-FP-DB-FBC-AB
1	TOOL	MCGRAW REMOTE CONFIGURATION TOOL PACKED	FSIR-100-PK

Submitted by LIGHTING ASSOCIATES

Job Name:
(new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES
Architect: BRiC PARTNERSHIP (BELLEVILLE)
Engineer: OATES AND ASSOCIATES

Catalog Number:
GLEON-AF-03-LED-480-T4W-BZ-MS/DIM-L40W
Notes:

Type:
A
LAI19-169707

McGraw-Edison

DESCRIPTION

The Galleon™ LED luminaire delivers exceptional performance in a highly scalable, low-profile design. Patented, high-efficiency AccuLED Optics™ system provides uniform and energy conscious illumination to walkways, parking lots, roadways, building areas and security lighting applications. IP66 rated and UL/cUL Listed for wet locations.

Catalog #		Type
Project		
Comments		Date
Prepared by		

SPECIFICATION FEATURES

Construction
Extruded aluminum driver enclosure thermally isolated from Light Squares for optimal thermal performance. Heavy-wall, die-cast aluminum end caps enclose housing and die-cast aluminum heat sinks. A unique, patent pending interlocking housing and heat sink provides scalability with superior structural rigidity. 3G vibration tested and rated. Optional tool-less hardware available for ease of entry into electrical chamber. Housing is IP66 rated.

Optics
Patented, high-efficiency injection-molded AccuLED Optics technology. Optics are precisely designed to shape the distribution maximizing efficiency and application spacing. AccuLED Optics create consistent distributions with the scalability to meet customized application requirements. Offered standard in 4000K (+/- 275K) CCT 70 CRI. Optional 3000K, 5000K and 6000K CCT.

Electrical
LED drivers are mounted to removable tray assembly for ease of maintenance. 120-277V 50/60Hz, 347V 60Hz or 480V 60Hz operation. 480V is compatible for use with 480V Wye systems only. Standard with 0-10V dimming. Shipped standard with Eaton proprietary circuit module designed to withstand 10kV of transient line surge. The Galleon LED luminaire is suitable for operation in -40°C to 40°C ambient environments. For applications with ambient temperatures exceeding 40°C, specify the HA (High Ambient) option. Light Squares are IP66 rated. Greater than 90% lumen maintenance expected at 60,000 hours. Available in standard 1A drive current and optional 600mA, 800mA and 1200mA drive currents (nominal).

Mounting
STANDARD ARM MOUNT: Extruded aluminum arm includes internal bolt guides allowing for easy positioning of fixture during mounting. When mounting two or more luminaires at 90° and 120° apart, the EA extended arm may be required. Refer to the arm mounting requirement table. Round pole adapter included. For wall mounting, specify wall mount bracket option. QUICK MOUNT ARM: Adapter is bolted directly to the pole. Quick mount arm slide into place on the adapter and is secured via two screws, facilitating quick and easy installation. The versatile, patent pending, quick mount arm accommodates multiple drill patterns ranging from 1-1/2" to 4-7/8". Removal of the door on the quick mount arm enables wiring of the fixture without having to access the driver compartment. A knock-out enables round pole mounting.

Finish
Housing finished in super durable TGIC polyester powder coat paint, 2.5 mil nominal thickness for superior protection against fade and wear. Heat sink is powder coated black. Standard housing colors include black, bronze, grey, white, dark platinum and graphite metallic. RAL and custom color matches available.

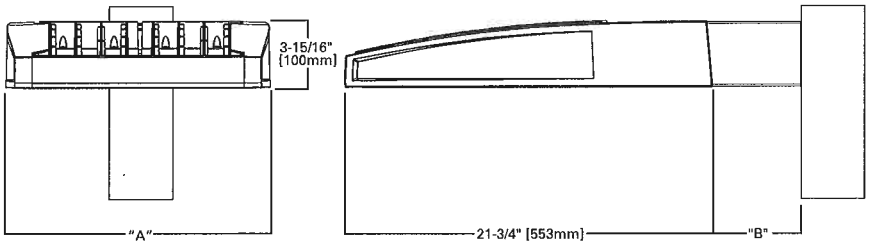
Warranty
Five-year warranty.

GLEON
GALLEON LED

1-10 Light Squares
Solid State LED

AREA/SITE LUMINAIRE

DIMENSIONS



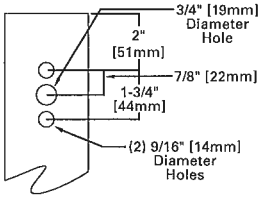
DIMENSION DATA

Number of Light Squares	"A" Width	"B" Standard Arm Length	"B" Optional Arm Length [1]	Weight with Arm (lbs.)	EPA with Arm [2] (Sq. Ft.)
1-4	15-1/2" (394mm)	7" (178mm)	10" (254mm)	33 (15.0 kgs.)	0.96
5-6	21-5/8" (549mm)	7" (178mm)	10" (254mm)	44 (20.0 kgs.)	1.00
7-8	27-5/8" (702mm)	7" (178mm)	13" (330mm)	54 (24.5 kgs.)	1.07
9-10	33-3/4" (857mm)	7" (178mm)	16" (406mm)	63 (28.6 kgs.)	1.12

NOTES: 1. Optional arm length to be used when mounting two fixtures at 90° on a single pole. 2. EPA calculated with optional arm length.

DRILLING PATTERN

TYPE "N"



CERTIFICATION DATA

UL/cUL Wet Location Listed
ISO 9001
LM79 / LM80 Compliant
3G Vibration Rated
IP66 Rated
DesignLights Consortium® Qualified*

ENERGY DATA

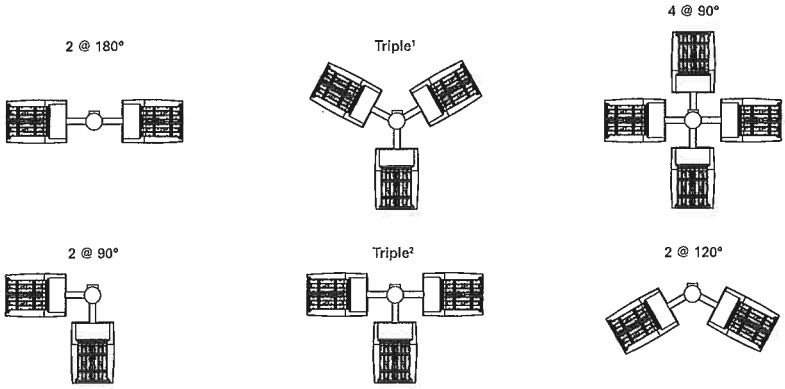
Electronic LED Driver
>0.9 Power Factor
<20% Total Harmonic Distortion
120V-277V 50/60Hz
347V & 480V 60Hz
-40°C Min. Temperature
40°C Max. Temperature
50°C Max. Temperature (HA Option)

*www.designlights.org

TD500020EN
June 21, 2018 4:04 PM

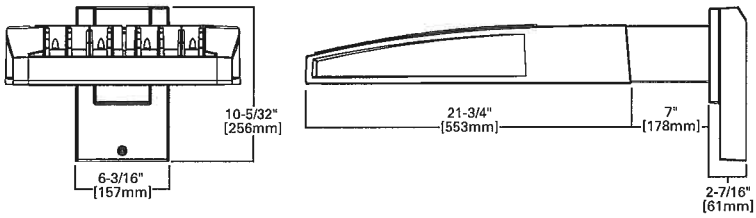
ARM MOUNTING REQUIREMENTS

Configuration	90° Apart	120° Apart
GLEON-AF-01	7" Arm (Standard)	7" Arm (Standard)
GLEON-AF-02	7" Arm (Standard)	7" Arm (Standard)
GLEON-AF-03	7" Arm (Standard)	7" Arm (Standard)
GLEON-AF-04	7" Arm (Standard)	7" Arm (Standard)
GLEON-AF-05	10" Extended Arm (Required)	7" Arm (Standard)
GLEON-AF-06	10" Extended Arm (Required)	7" Arm (Standard)
GLEON-AF-07	13" Extended Arm (Required)	13" Extended Arm (Required)
GLEON-AF-08	13" Extended Arm (Required)	13" Extended Arm (Required)
GLEON-AF-09	16" Extended Arm (Required)	16" Extended Arm (Required)
GLEON-AF-10	16" Extended Arm (Required)	16" Extended Arm (Required)

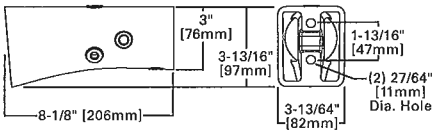


NOTES: 1 Round poles are 3 @ 120°. Square poles are 3 @ 90°. **2** Round poles are 3 @ 90°.

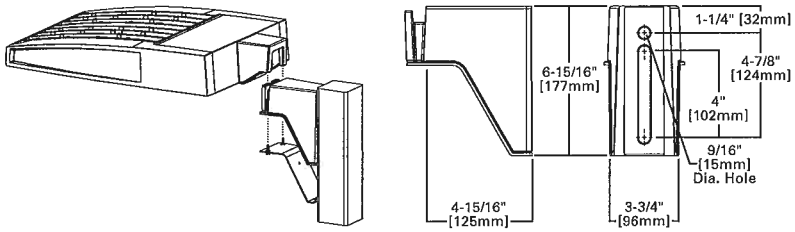
STANDARD WALL MOUNT



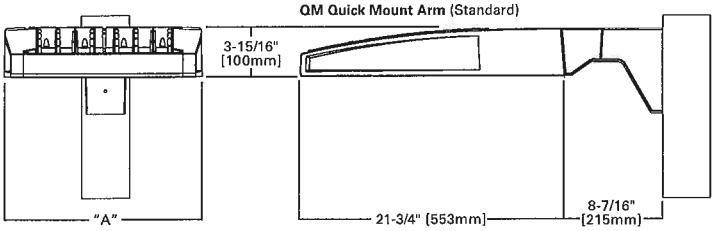
MAST ARM MOUNT



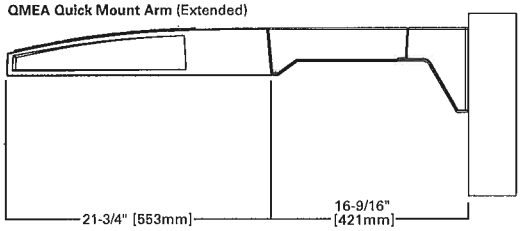
QUICK MOUNT ARM (INCLUDES FIXTURE ADAPTER)



QM Quick Mount Arm (Standard)



QMEA Quick Mount Arm (Extended)

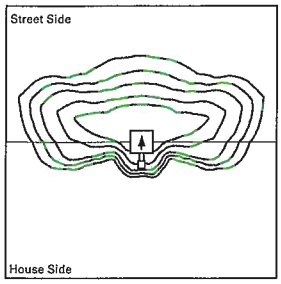


QUICK MOUNT ARM DATA

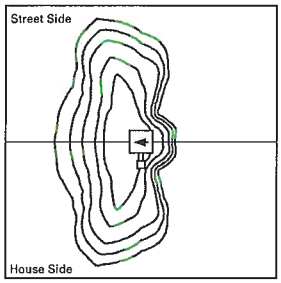
Number of Light Squares [1,2]	"A" Width	Weight with QM Arm (lbs.)	Weight with QMEA Arm (lbs.)	EPA (Sq. Ft.)
1-4	15-1/2" (394mm)	35 (15.91 kgs.)	38 (17.27 kgs.)	1.11
5-6 [3]	21-5/8" (549mm)	46 (20.91 kgs.)	49 (22.27 kgs.)	
7-8	27-5/8" (702mm)	56 (25.45 kgs.)	59 (26.82 kgs.)	

NOTES: 1 QM option available with 1-8 light square configurations. **2** QMEA option available with 1-6 light square configurations. **3** QMEA arm to be used when mounting two fixtures at 90° on a single pole.

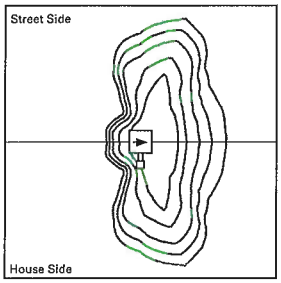
OPTIC ORIENTATION



Standard



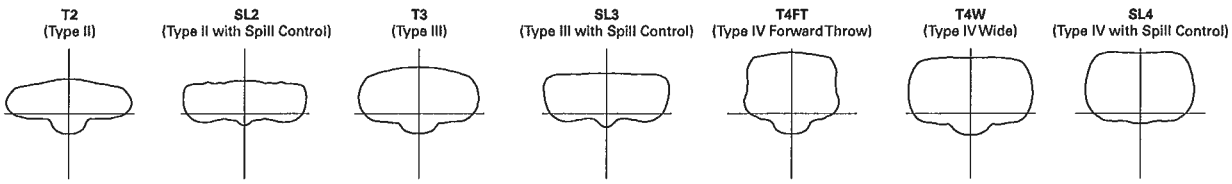
Optics Rotated Left @ 90° [L90]



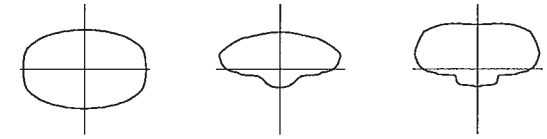
Optics Rotated Right @ 90° [R90]

OPTICAL DISTRIBUTIONS

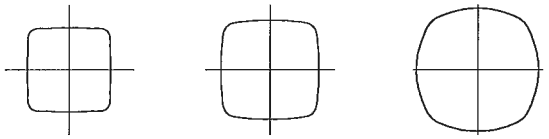
Asymmetric Area Distributions



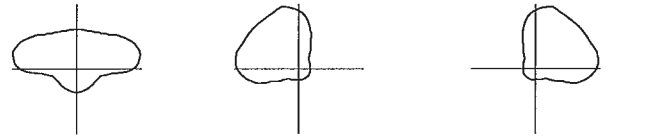
Asymmetric Roadway Distributions



Symmetric Distributions

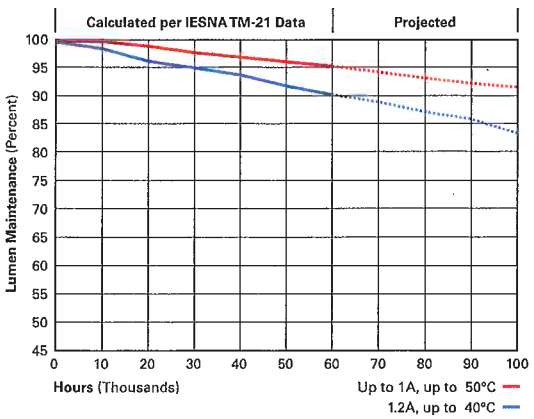


Specialized Distributions



LUMEN MAINTENANCE

Drive Current	Ambient Temperature	TM-21 Lumen Maintenance (60,000 Hours)	Projected L70 (Hours)
Up to 1A	Up to 50°C	> 95%	416,000
1.2A	Up to 40°C	> 90%	205,000



LUMEN MULTIPLIER

Ambient Temperature	Lumen Multiplier
0°C	1.02
10°C	1.01
25°C	1.00
40°C	0.99
50°C	0.97

NOMINAL POWER LUMENS (1.2A)

Number of Light Squares		1	2	3	4	5	6	7	8	9	10
Nominal Power (Watts)		67	129	191	258	320	382	448	511	575	640
Input Current @ 120V (A)		0.58	1.16	1.78	2.31	2.94	3.56	4.09	4.71	5.34	5.87
Input Current @ 208V (A)		0.33	0.63	0.93	1.27	1.57	1.87	2.22	2.52	2.8	3.14
Input Current @ 240V (A)		0.29	0.55	0.80	1.10	1.35	1.61	1.93	2.18	2.41	2.71
Input Current @ 277V (A)		0.25	0.48	0.70	0.96	1.18	1.39	1.69	1.90	2.09	2.36
Input Current @ 347V (A)		0.20	0.39	0.57	0.78	0.96	1.15	1.36	1.54	1.72	1.92
Input Current @ 480V (A)		0.15	0.30	0.43	0.60	0.73	0.85	1.03	1.16	1.28	1.45
Optics											
T2	4000K/5000K Lumens	6,709	13,111	19,562	25,848	32,026	38,325	45,324	51,355	57,286	63,424
	3000K Lumens	5,939	11,606	17,316	22,881	28,349	33,925	40,121	45,459	50,710	56,143
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
T2R	4000K/5000K Lumens	7,122	13,919	20,769	27,442	34,000	40,687	48,117	54,519	60,816	67,333
	3000K Lumens	5,939	11,606	17,316	22,881	28,349	33,925	40,121	45,459	50,710	56,143
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
T3	4000K/5000K Lumens	6,838	13,363	19,939	26,346	32,642	39,062	46,196	52,343	58,388	64,646
	3000K Lumens	6,053	11,829	17,650	23,321	28,895	34,578	40,893	46,334	51,685	57,225
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
T3R	4000K/5000K Lumens	6,990	13,660	20,382	26,931	33,368	39,930	47,223	53,506	59,686	66,081
	3000K Lumens	6,188	12,092	18,042	23,839	29,537	35,346	41,802	47,364	52,834	58,495
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
T4FT	4000K/5000K Lumens	6,878	13,440	20,055	26,499	32,832	39,289	46,464	52,646	58,726	65,020
	3000K Lumens	6,088	11,897	17,753	23,457	29,063	34,779	41,130	46,602	51,984	57,556
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
T4W	4000K/5000K Lumens	6,789	13,267	19,795	26,156	32,408	38,781	45,864	51,967	57,968	64,180
	3000K Lumens	6,010	11,744	17,523	23,153	28,688	34,329	40,599	46,001	51,313	56,812
	BUG Rating	B1-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
SL2	4000K/5000K Lumens	6,697	13,088	19,529	25,804	31,970	38,259	45,245	51,267	57,186	63,315
	3000K Lumens	5,928	11,585	17,287	22,842	28,300	33,867	40,051	45,382	50,621	56,046
	BUG Rating	B1-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
SL3	4000K/5000K Lumens	6,837	13,361	19,936	26,342	32,639	39,057	46,189	52,336	58,380	64,636
	3000K Lumens	6,052	11,827	17,647	23,318	28,892	34,573	40,887	46,328	51,678	57,216
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
SL4	4000K/5000K Lumens	6,496	12,695	18,943	25,029	31,011	37,110	43,886	49,727	55,470	61,414
	3000K Lumens	5,750	11,238	16,768	22,156	27,451	32,850	38,848	44,018	49,102	54,364
	BUG Rating	B1-U0-G2	B1-U0-G3	B2-U0-G4	B2-U0-G4	B2-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
5NQ	4000K/5000K Lumens	7,052	13,781	20,564	27,171	33,664	40,285	47,641	53,981	60,215	66,669
	3000K Lumens	6,242	12,199	18,203	24,052	29,799	35,660	42,172	47,784	53,302	59,015
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4
5MQ	4000K/5000K Lumens	7,182	14,034	20,942	27,671	34,284	41,027	48,518	54,975	61,323	67,896
	3000K Lumens	6,358	12,423	18,538	24,494	30,348	36,317	42,948	48,664	54,283	60,102
	BUG Rating	B3-U0-G1	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5	B5-U0-G5
5WQ	4000K/5000K Lumens	7,201	14,073	20,998	27,744	34,375	41,136	48,648	55,121	61,487	68,077
	3000K Lumens	6,374	12,457	18,587	24,559	30,429	36,414	43,063	48,793	54,428	60,262
	BUG Rating	B3-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5	B5-U0-G5	B5-U0-G5
SLL/SLR	4000K/5000K Lumens	6,009	11,741	17,519	23,148	28,681	34,321	40,589	45,990	51,301	56,798
	3000K Lumens	5,319	10,393	15,508	20,491	25,388	30,381	35,929	40,710	45,412	50,278
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5
RW	4000K/5000K Lumens	6,989	13,657	20,378	26,925	33,360	39,921	47,211	53,494	59,672	66,066
	3000K Lumens	6,187	12,089	18,039	23,834	29,530	35,338	41,791	47,353	52,822	58,482
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G4
AFL	4000K/5000K Lumens	7,014	13,706	20,452	27,023	33,481	40,066	47,383	53,688	59,888	66,306
	3000K Lumens	6,209	12,133	18,104	23,921	29,637	35,466	41,943	47,525	53,013	58,694
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G4	B4-U0-G4	B4-U0-G4

* Nominal data for 70 CRI.

NOMINAL POWER LUMENS (1A)

Number of Light Squares		1	2	3	4	5	6	7	8	9	10
Nominal Power (Watts)		59	113	166	225	279	333	391	445	501	558
Input Current @ 120V (A)		0.51	1.02	1.53	2.03	2.55	3.06	3.56	4.08	4.6	5.07
Input Current @ 208V (A)		0.29	0.56	0.82	1.11	1.37	1.64	1.93	2.19	2.46	2.75
Input Current @ 240V (A)		0.26	0.48	0.71	0.96	1.19	1.41	1.67	1.89	2.12	2.39
Input Current @ 277V (A)		0.23	0.42	0.61	0.83	1.03	1.23	1.45	1.65	1.84	2.09
Input Current @ 347V (A)		0.17	0.32	0.50	0.64	0.82	1.00	1.14	1.32	1.50	1.68
Input Current @ 480V (A)		0.14	0.24	0.37	0.48	0.61	0.75	0.91	0.99	1.12	1.28
Optics											
T2	4000K/5000K Lumens	6,116	11,951	17,833	23,563	29,195	34,937	41,317	46,814	52,221	57,817
	3000K Lumens	5,414	10,579	15,786	20,858	25,843	30,926	36,574	41,440	46,226	51,180
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
T2R	4000K/5000K Lumens	6,493	12,688	18,932	25,015	30,994	37,090	43,863	49,699	55,439	61,380
	3000K Lumens	5,748	11,231	16,759	22,143	27,436	32,832	38,828	43,994	49,075	54,334
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5
T3	4000K/5000K Lumens	6,234	12,181	18,176	24,017	29,756	35,609	42,111	47,715	53,225	58,930
	3000K Lumens	5,518	10,783	16,089	21,260	26,340	31,521	37,277	42,237	47,115	52,165
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
T3R	4000K/5000K Lumens	6,372	12,453	18,580	24,550	30,418	36,400	43,048	48,776	54,409	60,239
	3000K Lumens	5,640	11,023	16,447	21,732	26,926	32,221	38,106	43,177	48,163	53,324
	BUG Rating	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5
T4FT	4000K/5000K Lumens	6,270	12,252	18,282	24,156	29,929	35,815	42,356	47,992	53,534	59,271
	3000K Lumens	5,550	10,845	16,183	21,383	26,493	31,703	37,494	42,483	47,388	52,467
	BUG Rating	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
T4W	4000K/5000K Lumens	6,189	12,094	18,045	23,844	29,543	35,352	41,809	47,372	52,843	58,506
	3000K Lumens	5,479	10,706	15,973	21,107	26,151	31,294	37,009	41,934	46,777	51,790
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
SL2	4000K/5000K Lumens	6,105	11,931	17,803	23,522	29,144	34,877	41,245	46,734	52,130	57,717
	3000K Lumens	5,404	10,561	15,759	20,822	25,798	30,873	36,510	41,369	46,145	51,091
	BUG Rating	B1-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
SL3	4000K/5000K Lumens	6,233	12,180	18,174	24,013	29,753	35,604	42,106	47,708	53,218	58,921
	3000K Lumens	5,517	10,782	16,088	21,256	26,337	31,517	37,272	42,231	47,109	52,157
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
SL4	4000K/5000K Lumens	5,922	11,572	17,268	22,816	28,269	33,829	40,006	45,330	50,566	55,984
	3000K Lumens	5,242	10,244	15,286	20,197	25,024	29,945	35,413	40,126	44,761	49,557
	BUG Rating	B1-U0-G2	B1-U0-G3	B2-U0-G3	B2-U0-G4	B2-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
5NQ	4000K/5000K Lumens	6,429	12,563	18,746	24,768	30,688	36,723	43,429	49,208	54,891	60,775
	3000K Lumens	5,691	11,121	16,594	21,925	27,165	32,507	38,443	43,559	48,590	53,798
	BUG Rating	B2-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4
5MQ	4000K/5000K Lumens	6,547	12,794	19,090	25,224	31,253	37,400	44,228	50,114	55,902	61,893
	3000K Lumens	5,795	11,325	16,898	22,328	27,665	33,106	39,151	44,361	49,484	54,788
	BUG Rating	B3-U0-G1	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5
5WQ	4000K/5000K Lumens	6,564	12,828	19,141	25,291	31,336	37,499	44,347	50,248	56,051	62,058
	3000K Lumens	5,810	11,355	16,944	22,388	27,739	33,194	39,256	44,480	49,616	54,934
	BUG Rating	B3-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5	B5-U0-G5	B5-U0-G5
SLL/SLR	4000K/5000K Lumens	5,478	10,703	15,970	21,102	26,145	31,286	37,001	41,924	46,765	51,777
	3000K Lumens	4,849	9,474	14,137	18,679	23,144	27,694	32,753	37,111	41,396	45,833
	BUG Rating	B1-U0-G2	B1-U0-G3	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
RW	4000K/5000K Lumens	6,371	12,449	18,576	24,544	30,411	36,392	43,037	48,764	54,396	60,225
	3000K Lumens	5,640	11,020	16,443	21,726	26,920	32,214	38,096	43,166	48,151	53,311
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4
AFL	4000K/5000K Lumens	6,394	12,494	18,644	24,634	30,521	36,524	43,194	48,942	54,593	60,444
	3000K Lumens	5,660	11,060	16,504	21,806	27,017	32,331	38,235	43,323	48,326	53,505
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3	B4-U0-G4	B4-U0-G4

* Nominal data for 70 CRI.

NOMINAL POWER LUMENS (800MA)

Number of Light Squares		1	2	3	4	5	6	7	8	9	10
Nominal Power (Watts)		44	85	124	171	210	249	295	334	374	419
Input Current @ 120V (A)		0.39	0.77	1.13	1.54	1.90	2.26	2.67	3.03	3.39	3.80
Input Current @ 208V (A)		0.22	0.44	0.62	0.88	1.06	1.24	1.50	1.68	1.87	2.12
Input Current @ 240V (A)		0.19	0.38	0.54	0.76	0.92	1.08	1.30	1.46	1.62	1.84
Input Current @ 277V (A)		0.17	0.36	0.47	0.72	0.83	0.95	1.19	1.31	1.42	1.67
Input Current @ 347V (A)		0.15	0.24	0.38	0.49	0.63	0.77	0.87	1.01	1.15	1.52
Input Current @ 480V (A)		0.11	0.18	0.29	0.37	0.48	0.59	0.66	0.77	0.88	0.96
Optics											
T2	4000K/5000K Lumens	4,941	9,656	14,408	19,038	23,588	28,227	33,382	37,823	42,191	46,713
	3000K Lumens	4,374	8,547	12,754	16,852	20,880	24,987	29,550	33,481	37,347	41,350
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B4-U0-G5	B4-U0-G5
T2R	4000K/5000K Lumens	5,246	10,251	15,296	20,211	25,041	29,966	35,439	40,154	44,791	49,592
	3000K Lumens	4,644	9,074	13,540	17,891	22,166	26,526	31,371	35,544	39,649	43,899
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5
T3	4000K/5000K Lumens	5,037	9,842	14,685	19,404	24,041	28,770	34,024	38,551	43,003	47,612
	3000K Lumens	4,459	8,712	12,999	17,176	21,281	25,467	30,118	34,125	38,066	42,146
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5
T3R	4000K/5000K Lumens	5,148	10,061	15,011	19,835	24,576	29,409	34,780	39,408	43,959	48,669
	3000K Lumens	4,557	8,906	13,288	17,558	21,755	26,033	30,787	34,884	38,913	43,082
	BUG Rating	B1-U0-G2	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
T4FT	4000K/5000K Lumens	5,066	9,899	14,770	19,516	24,181	28,936	34,221	38,774	43,252	47,888
	3000K Lumens	4,484	8,763	13,074	17,276	21,405	25,614	30,292	34,323	38,287	42,390
	BUG Rating	B1-U0-G2	B1-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
T4W	4000K/5000K Lumens	5,000	9,771	14,579	19,264	23,869	28,562	33,779	38,274	42,694	47,269
	3000K Lumens	4,426	8,649	12,905	17,052	21,129	25,283	29,901	33,880	37,793	41,843
	BUG Rating	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
SL2	4000K/5000K Lumens	4,933	9,639	14,383	19,005	23,547	28,178	33,324	37,758	42,118	46,632
	3000K Lumens	4,367	8,532	12,732	16,823	20,844	24,943	29,498	33,423	37,283	41,279
	BUG Rating	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5
SL3	4000K/5000K Lumens	5,036	9,841	14,683	19,401	24,039	28,766	34,019	38,546	42,997	47,605
	3000K Lumens	4,458	8,711	12,997	17,174	21,279	25,464	30,114	34,121	38,061	42,140
	BUG Rating	B1-U0-G2	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
SL4	4000K/5000K Lumens	4,784	9,350	13,951	18,434	22,840	27,332	32,323	36,624	40,854	45,232
	3000K Lumens	4,235	8,277	12,349	16,318	20,218	24,194	28,612	32,420	36,164	40,039
	BUG Rating	B1-U0-G2	B1-U0-G3	B1-U0-G3	B2-U0-G4	B2-U0-G4	B2-U0-G5	B2-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
5NQ	4000K/5000K Lumens	5,194	10,150	15,145	20,011	24,794	29,670	35,088	39,757	44,349	49,102
	3000K Lumens	4,598	8,985	13,406	17,714	21,948	26,264	31,060	35,193	39,258	43,465
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G3
5MQ	4000K/5000K Lumens	5,290	10,337	15,424	20,380	25,250	30,217	35,734	40,489	45,165	50,006
	3000K Lumens	4,683	9,150	13,653	18,040	22,351	26,748	31,632	35,841	39,980	44,265
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G4
5WQ	4000K/5000K Lumens	5,304	10,365	15,465	20,434	25,318	30,297	35,830	40,597	45,286	50,139
	3000K Lumens	4,695	9,175	13,690	18,088	22,411	26,819	31,717	35,936	40,087	44,383
	BUG Rating	B3-U0-G1	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5
SLL/SLR	4000K/5000K Lumens	4,426	8,648	12,903	17,049	21,124	25,278	29,894	33,872	37,784	41,832
	3000K Lumens	3,918	7,655	11,422	15,092	18,699	22,376	26,462	29,983	33,446	37,030
	BUG Rating	B1-U0-G2	B1-U0-G2	B2-U0-G3	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
RW	4000K/5000K Lumens	5,147	10,058	15,009	19,830	24,570	29,402	34,771	39,399	43,949	48,658
	3000K Lumens	4,556	8,903	13,286	17,554	21,749	26,027	30,779	34,876	38,904	43,072
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G4
AFL	4000K/5000K Lumens	5,166	10,095	15,063	19,903	24,659	29,509	34,898	39,542	44,108	48,835
	3000K Lumens	4,573	8,936	13,334	17,618	21,828	26,121	30,892	35,003	39,044	43,229
	BUG Rating	B1-U0-G1	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3

* Nominal data for 70 CRI.

NOMINAL POWER LUMENS (600MA)

Number of Light Squares		1	2	3	4	5	6	7	8	9	10
Nominal Power (Watts)		34	66	96	129	162	193	226	257	290	323
Input Current @ 120V (A)		0.30	0.58	0.86	1.16	1.44	1.73	2.03	2.33	2.59	2.89
Input Current @ 208V (A)		0.17	0.34	0.49	0.65	0.84	0.99	1.14	1.30	1.48	1.63
Input Current @ 240V (A)		0.15	0.30	0.43	0.56	0.74	0.87	1.00	1.13	1.30	1.43
Input Current @ 277V (A)		0.14	0.28	0.41	0.52	0.69	0.81	0.93	1.04	1.22	1.33
Input Current @ 347V (A)		0.11	0.19	0.30	0.39	0.49	0.60	0.69	0.77	0.90	0.99
Input Current @ 480V (A)		0.08	0.15	0.24	0.30	0.38	0.48	0.53	0.59	0.71	0.77
Optics											
T2	4000K/5000K Lumens	4,029	7,874	11,749	15,525	19,235	23,019	27,222	30,844	34,406	38,093
	3000K Lumens	3,566	6,970	10,400	13,743	17,027	20,376	24,097	27,303	30,456	33,720
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G4
T2R	4000K/5000K Lumens	4,278	8,360	12,474	16,482	20,421	24,437	28,900	32,745	36,527	40,441
	3000K Lumens	3,787	7,400	11,042	14,590	18,077	21,632	25,582	28,986	32,334	35,798
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4
T3	4000K/5000K Lumens	4,107	8,026	11,976	15,824	19,605	23,461	27,746	31,438	35,068	38,827
	3000K Lumens	3,636	7,105	10,601	14,007	17,354	20,768	24,561	27,829	31,042	34,370
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
T3R	4000K/5000K Lumens	4,198	8,205	12,242	16,175	20,041	23,982	28,363	32,137	35,848	39,689
	3000K Lumens	3,716	7,263	10,837	14,318	17,740	21,229	25,107	28,448	31,733	35,133
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
T4FT	4000K/5000K Lumens	4,131	8,072	12,045	15,915	19,719	23,597	27,907	31,620	35,272	39,052
	3000K Lumens	3,657	7,145	10,662	14,088	17,455	20,888	24,703	27,990	31,223	34,569
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5
T4W	4000K/5000K Lumens	4,077	7,968	11,889	15,710	19,465	23,292	27,546	31,212	34,816	38,547
	3000K Lumens	3,609	7,053	10,524	13,906	17,230	20,618	24,384	27,629	30,819	34,122
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5
SL2	4000K/5000K Lumens	4,022	7,861	11,729	15,498	19,202	22,979	27,175	30,791	34,347	38,028
	3000K Lumens	3,560	6,959	10,383	13,719	16,998	20,341	24,055	27,256	30,404	33,662
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
SL3	4000K/5000K Lumens	4,106	8,025	11,974	15,821	19,603	23,458	27,742	31,433	35,064	38,821
	3000K Lumens	3,635	7,104	10,599	14,005	17,353	20,765	24,557	27,824	31,039	34,364
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G3	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
SL4	4000K/5000K Lumens	3,902	7,624	11,377	15,033	18,626	22,289	26,359	29,867	33,316	36,886
	3000K Lumens	3,454	6,749	10,071	13,307	16,488	19,730	23,333	26,438	29,491	32,651
	BUG Rating	B1-U0-G2	B1-U0-G2	B1-U0-G3	B1-U0-G3	B2-U0-G4	B2-U0-G4	B2-U0-G4	B2-U0-G5	B3-U0-G5	B3-U0-G5
5NQ	4000K/5000K Lumens	4,236	8,277	12,351	16,319	20,219	24,196	28,614	32,422	36,166	40,042
	3000K Lumens	3,750	7,327	10,933	14,446	17,898	21,418	25,329	28,700	32,014	35,445
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G2	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G2	B5-U0-G3	B5-U0-G3
5MQ	4000K/5000K Lumens	4,314	8,429	12,578	16,619	20,591	24,641	29,141	33,019	36,832	40,779
	3000K Lumens	3,819	7,461	11,134	14,711	18,227	21,812	25,796	29,228	32,604	36,098
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4
5WQ	4000K/5000K Lumens	4,325	8,452	12,611	16,664	20,646	24,707	29,219	33,106	36,930	40,888
	3000K Lumens	3,828	7,482	11,163	14,751	18,276	21,871	25,865	29,305	32,690	36,194
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G4
SLL/SLR	4000K/5000K Lumens	3,609	7,052	10,522	13,903	17,226	20,613	24,378	27,622	30,812	34,114
	3000K Lumens	3,195	6,242	9,314	12,307	15,248	18,247	21,579	24,451	27,275	30,198
	BUG Rating	B1-U0-G1	B1-U0-G2	B1-U0-G3	B2-U0-G3	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
RW	4000K/5000K Lumens	4,197	8,202	12,239	16,171	20,036	23,977	28,356	32,129	35,839	39,680
	3000K Lumens	3,715	7,260	10,834	14,315	17,736	21,224	25,101	28,441	31,725	35,125
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3
AFL	4000K/5000K Lumens	4,213	8,232	12,284	16,230	20,109	24,064	28,459	32,246	35,969	39,824
	3000K Lumens	3,729	7,287	10,874	14,367	17,800	21,301	25,192	28,544	31,840	35,252
	BUG Rating	B1-U0-G1	B1-U0-G1	B2-U0-G2	B2-U0-G2	B2-U0-G2	B3-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3

* Nominal data for 70 CRI.

CONTROL OPTIONS

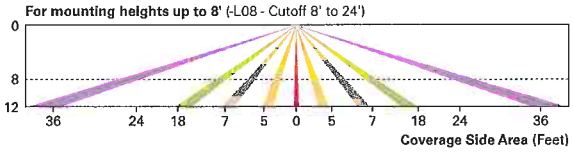
0-10V (DIM)
This fixture is offered standard with 0-10V dimming driver(s). The DIM option provides 0-10V dimming wire leads for use with a lighting control panel or other control method.

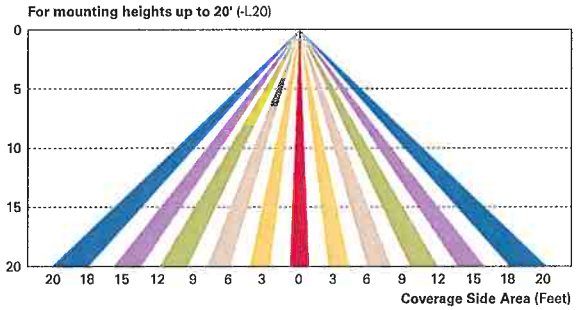
Photocontrol (P, R and PER7)
Optional button-type photocontrol (P) and photocontrol receptacles (R and PER7) provide a flexible solution to enable "dusk-to-dawn" lighting by sensing light levels. Advanced control systems compatible with NEMA 7-pin standards can be utilized with the PER7 receptacle.

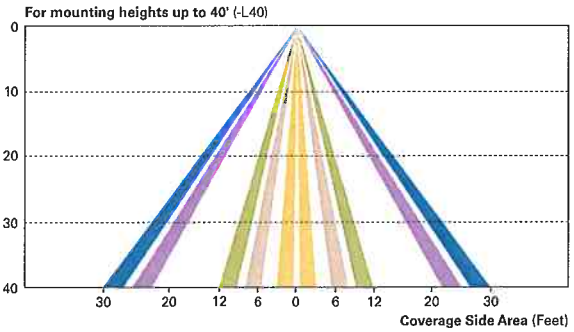
After Hours Dim (AHD)
This feature allows photocontrol-enabled luminaires to achieve additional energy savings by dimming during scheduled portions of the night. The dimming profile will automatically take effect after a "dusk-to-dawn" period has been calculated from the photocontrol input. Specify the desired dimming profile for a simple, factory-shipped dimming solution requiring no external control wiring. Reference the After Hours Dim supplemental guide for additional information.

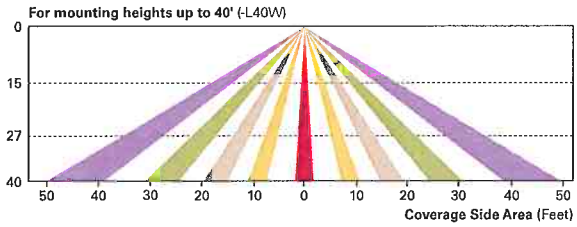
Dimming Occupancy Sensor (MS/DIM-LXX, MS/X-LXX and MS-LXX)
These sensors are factory installed in the luminaire housing. When the MS/DIM-LXX sensor option is selected, the occupancy sensor is connected to a dimming driver and the entire luminaire dims when there is no activity detected. When activity is detected, the luminaire returns to full light output. The MS/DIM sensor is factory preset to dim down to approximately 50 percent power with a time delay of five minutes. The MS-LXX sensor is factory preset to turn the luminaire off after five minutes of no activity. The MS/X-LXX is also preset for five minutes and only controls the specified number of light engines to maintain steady output from the remaining light engines.

These occupancy sensors includes an integral photocell that can be activated with the FSIR-100 accessory for "dusk-to-dawn" control or daylight harvesting - the factory preset is OFF. The FSIR-100 is a wireless tool utilized for changing the dimming level, time delay, sensitivity and other parameters. A variety of sensor lens are available to optimize the coverage pattern for mounting heights from 8'-40'.

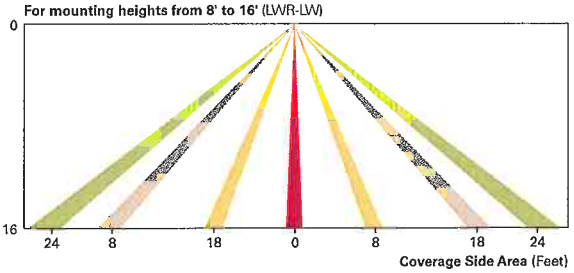


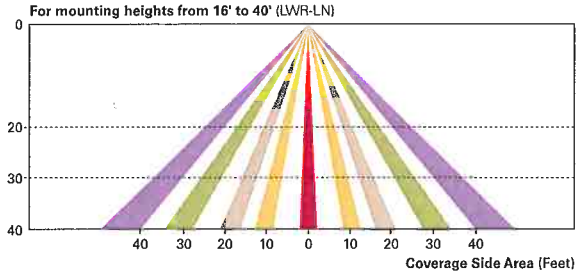






LumaWatt Pro Wireless Control and Monitoring System (LWR-LW and LWR-LN)
The Eaton's LumaWatt Pro powered by Enlighted is a connected lighting solution that combines a broad selection of energy-efficient LED luminaires with a powerful integrated wireless sensor system. The sensor controls the lighting system in compliance with the latest energy codes and collects valuable data about building performance and use. Software applications turn the granular data into information through energy dashboards and specialized apps that make it simple and help optimize the use of building resources, beyond lighting.





WaveLinx Wireless Outdoor Lighting Control Module (WOLC-7P-10A)
The 7-pin wireless outdoor lighting control module enables WaveLinx to control outdoor area, site and flood lighting. WaveLinx controls outdoor lighting using schedules to provide ON, OFF and dimming controls based on astronomic or time schedules based on a 7 day week.

ORDERING INFORMATION

Sample Number: GLEON-AF-04-LED-E1-T3-GM-QM

Product Family [1,2]	Light Engine	Number of Light Squares [3]	Lamp Type	Voltage	Distribution	Color	Mounting
GLEON=Galleon	AF=1A Drive Current	01=1 02=2 03=3 04=4 05=5 [4] 06=6 07=7 [5] 08=8 [6] 09=9 [6] 10=10 [6]	LED=Solid State Light Emitting Diodes	E1=120-277V 347=347V [7] 480=480V [7,8]	T2=Type II T2R=Type II Roadway T3=Type III T3R=Type III Roadway T4FT=Type IV Forward Throw T4W=Type IV Wide 5NQ=Type V Narrow 5MQ=Type V Square Medium 5WQ=Type V Square Wide SL2=Type II w/Spill Control SL3=Type III w/Spill Control SL4=Type IV w/Spill Control SLL=90° Spill Light Eliminator Left SLR=90° Spill Light Eliminator Right RW=Rectangular Wide Type I AFL=Automotive Frontline	AP=Grey BZ=Bronze BK=Black DP=Dark Platinum GM=Graphite Metallic WH=White	[Blank]=Arm for Round or Square Pole EA=Extended Arm [9] MA=Mast Arm Adapter [10] WM=Wall Mount QM=Quick Mount Arm (Standard Length) [11] QMEA=Quick Mount Arm (Extended Length) [12]

Options (Add as Suffix)	Accessories (Order Separately)
7030=70 CRI 3000K [13] 8030=80 CRI 3000K [14] 7050=70 CRI 5000K [13] 7080=70 CRI 6000K [13] 600=Drive Current Factory Set to Nominal 600mA [15] 800=Drive Current Factory Set to Nominal 800mA [15] 1200=Drive Current Factory Set to Nominal 1200mA [15,16] F=Single Fuse (120, 277 or 347V. Must Specify Voltage) FF=Double Fuse (208, 240 or 480V. Must Specify Voltage) 2L=Two Circuits [17,18] DIM=External 0-10V Dimming Leads [19,20] P=Button Type Photocontrol (120, 208, 240 or 277V. Must Specify Volatage) [21] PER7=NEMA 7-PIN Twistlock Photocontrol Receptacle [21] R=NEMA Twistlock Photocontrol Receptacle [21] AHD145=After Hours Dim, 5 Hours [22] AHD245=After Hours Dim, 6 Hours [22] AHD255=After Hours Dim, 7 Hours [22] AHD355=After Hours Dim, 8 Hours [22] HA=50°C High Ambient [23] MS/DIM-L08=Motion Sensor for Dimming Operation, Maximum 8' Mounting Height [24,25] MS/DIM-L20=Motion Sensor for Dimming Operation, 9' - 20' Mounting Height [24,26] MS/DIM-L40=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height [22,28] MS/DIM-L40W=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height (Wide Range) [24,28] MS/X-L08=Bi-Level Motion Sensor, Maximum 8' Mounting Height [24,26,29] MS/X-L20=Bi-Level Motion Sensor, 9' - 20' Mounting Height [24,26,29] MS/X-L40=Bi-Level Motion Sensor, 21' - 40' Mounting Height [22,27,29] MS/X-L40W=Bi-Level Motion Sensor, 21' - 40' Mounting Height (Wide Range) [24,28,29] MS-L08=Motion Sensor for ON/OFF Operation, Maximum 8' Mounting Height [24,25] MS-L20=Motion Sensor for ON/OFF Operation, 9' - 20' Mounting Height [24,26] MS-L40=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height [24,27] MS-L40W=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height (Wide Range) [24,28] LWR-LW=LumaWatt Pro Wireless Sensor, Wide Lens for 8' - 16' Mounting Height [30] LWR-LN=LumaWatt Pro Wireless Sensor, Narrow Lens for 16' - 40' Mounting Height [30] L90=Optics Rotated 90° Left R90=Optics Rotated 90° Right MT=Factory Installed Mesh Top TH=Tool-less Door Hardware LCF=Light Square Trim Plate Painted to Match Housing [31] HSS=Factory Installed House Side Shield [32] CE=CE Marking [33]	OA/RA1016=NEMA Photocontrol Multi-Tap - 105-285V OA/RA1027=NEMA Photocontrol - 480V OA/RA1201=NEMA Photocontrol - 347V OA/RA1013=Photocontrol Shorting Cap OA/RA1014=120V Photocontrol MA1252=10kV Surge Module Replacement MA1036-XX=Single Tenon Adapter for 2-3/8" O.D. Tenon MA1037-XX=2@180° Tenon Adapter for 2-3/8" O.D. Tenon MA1197-XX=3@120° Tenon Adapter for 2-3/8" O.D. Tenon MA1188-XX=4@90° Tenon Adapter for 2-3/8" O.D. Tenon MA1189-XX=2@90° Tenon Adapter for 2-3/8" O.D. Tenon MA1190-XX=3@90° Tenon Adapter for 2-3/8" O.D. Tenon MA1191-XX=2@120° Tenon Adapter for 2-3/8" O.D. Tenon MA1038-XX=Single Tenon Adapter for 3-1/2" O.D. Tenon MA1039-XX=2@180° Tenon Adapter for 3-1/2" O.D. Tenon MA1192-XX=3@120° Tenon Adapter for 3-1/2" O.D. Tenon MA1193-XX=4@90° Tenon Adapter for 3-1/2" O.D. Tenon MA1194-XX=2@90° Tenon Adapter for 3-1/2" O.D. Tenon MA1195-XX=3@90° Tenon Adapter for 3-1/2" O.D. Tenon FSIR-100=Wireless Configuration Tool for Occupancy Sensor [24] GLEON-MT1=Field Installed Mesh Top for 1-4 Light Squares GLEON-MT2=Field Installed Mesh Top for 5-6 Light Squares GLEON-MT3=Field Installed Mesh Top for 7-8 Light Squares GLEON-MT4=Field Installed Mesh Top for 9-10 Light Squares GLEON-QM=Quick Mount Arm Kit [10] GLEON-QMEA=Quick Mount Extended Arm Kit [11] LS/HSS=Field Installed House Side Shield [32,34] WOLC-7P-10A=WaveLinx Outdoor Control Module (7-pin) [35]

NOTES:
1. Customer is responsible for engineering analysis to confirm pole and fixture compatibility for all applications. Refer to our white paper WP513001EN for additional support information.
2. DesignLights Consortium® Qualified. Refer to www.designlights.org Qualified Products List under Family Models for details.
3. Standard 4000K CCT and minimum 70 CRI.
4. Not compatible with MS/4-LXX or MS/1-LXX sensors.
5. Not compatible with extended quick mount arm (QMEA).
6. Not compatible with standard quick mount arm (QM) or extended quick mount arm (QMEA).
7. Requires the use of an internal step down transformer when combined with sensor options. Not available with sensor at 1200mA. Not available in combination with the HA high ambient and sensor options at 1A.
8. Only for use with 480V Wye systems. Per NEC, not for use with ungrounded systems, impedance grounded systems or corner grounded systems (commonly known as Three Phase Three Wire Delta, Three Phase High Leg Delta and Three Phase Corner Grounded Delta systems).
9. May be required when two or more luminaires are oriented on a 90° or 120° drilling pattern. Refer to arm mounting requirement table.
10. Factory installed.
11. Maximum 8 light squares.
12. Maximum 6 light squares.
13. Extended lead times apply. Use dedicated IES files for 3000K, 5000K and 6000K when performing layouts. These files are published on the Galleon luminaire product page on the website.
14. Extended lead times apply. Use dedicated IES files for 3000K, 5000K and 6000K when performing layouts. These files are published on the Galleon luminaire product page on the website.
15. 1 Amp standard. Use dedicated IES files for 600mA, 800mA and 1200mA when performing layouts. These files are published on the Galleon luminaire product page on the website.
16. Not available with HA option.
17. 2L is not available with MS, MS/X or MS/DIM at 347V or 480V. 2L in AF-02 through AF-04 requires a larger housing, normally used for AF-05 or AF-06. Extended arm option may be required when mounting two or more fixtures per pole at 90° or 120°. Refer to arm mounting requirement table.
18. Not available with LumaWatt Pro wireless sensors.
19. Cannot be used with other control options.
20. Low voltage control lead brought out 18" outside fixture.
21. Not available if any "MS" sensor is selected. Motion sensor has an integral photocell.
22. Requires the use of P photocontrol or the PER7 or R photocontrol receptacle with photocontrol accessory. See After Hours Dim supplemental guide for additional information.
23. 50°C lumen maintenance data applies to 600mA, 800mA and 1A drive currents.
24. The FSIR-100 configuration tool is required to adjust parameters including high and low modes, sensitivity, time delay, cutoff and more. Consult your lighting representative at Eaton for more information.
25. Approximately 22' detection diameter at 8' mounting height.
26. Approximately 40' detection diameter at 20' mounting height.
27. Approximately 60' detection diameter at 40' mounting height.
28. Approximately 100' detection diameter at 40' mounting height.
29. Replace X with number of Light Squares operating in low output mode.
30. LumaWatt Pro wireless sensors are factory installed only requiring network components LWP-EM-1, LWP-GW-1 and LWP-PoE8 in appropriate quantities. See www.eaton.com/lighting for LumaWatt Pro application information.
31. Not available with house side shield (HSS).
32. Only for use with SL2, SL3, SL4 and AFL distributions. The Light Square trim plate is painted black when the HSS option is selected.
33. CE is not available with the LWR, MS, MS/X, MS/DIM, P, R or PER7 options. Available in 120-277V only.
34. One required for each Light Square.
35. Requires 7-pin NEMA twistlock photocontrol receptacle.

EATON
Powering Business Worldwide

Eaton
1121 Highway 74 South
Peachtree City, GA 30269
P: 770-486-4800
www.eaton.com/lighting

Specifications and dimensions subject to change without notice.

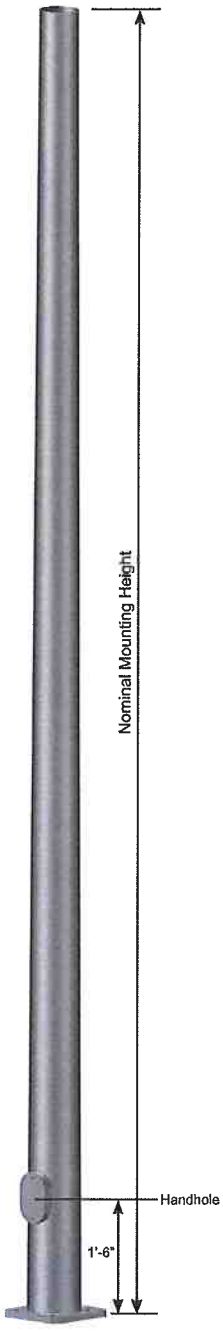
Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES	**Catalog Number:** GLEON-AF-03-LED-480-T4W-BZ-MS/DIM-L40W Notes:	**Type:** A LAI19-169707

Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES	**Catalog Number:** DS210-850A350-D2-FP-DB-FBC-AB Notes:	**Type:** A LAI19-169707

valmont STRUCTURES

ROUND TAPERED STEEL DS210
Light Duty

Job Name:	Client Name:
Job Location - City: State:	Created By: Date:
Product: Quote:	Customer Approval: Date:



Tenon Top

Pole Cap

Cross Section

Handhole

Full Base Cover (Standard Square)

Dart Square-2T (Optional)

Dart Round - DT (Optional)

SPECIFICATIONS

Pole Shaft - The pole shaft is a 1-piece assembly conforming to ASTM A595 Grade A or A572 Grade 55 with a constant linear taper of 0.14 in/ft.

Pole Top - Pole is provided with either a tenon top or drilled for a fixture mounting. A removable pole cap is provided for drilled poles. Consult the luminaire manufacturer for correct tenon size or drill pattern. Other pole top options include pole cap only (PC) or plain top (PL) which is typical when the pole top diameter matches the necessary slip fit dimensions.

Handhole - A reinforced handhole with grounding provision is provided at 1'-6" from the base end of the pole assembly. Each handhole includes a cover and the cover attachment hardware. Poles with a 5.90" base diameter are supplied with a 3" X 5" rectangular handhole. All other pole assemblies are provided with a 4" X 6.5" ovalized handhole. Handhole dimensions are nominal.

Base Cover - A two-piece full base cover fabricated from ABS plastic is provided with each pole assembly. Valmont reserves the right to provide a two-piece steel full base cover on some applications depending upon the finish requirement and/or pole base diameter. Nut covers can be substituted on most models. Additional base cover options, including the Dart Square (2T) cast aluminum cover and Dart Round (DT) cast aluminum cover, are available upon request.

Anchor Bolts - Anchor bolts conform to ASTM F1554 Grade 55 and are provided with two hex nuts and two flat washers. Bolts have an "L" bend on one end and are galvanized a minimum of 12" on the threaded end.

Hardware - All structural fasteners are galvanized high strength carbon steel. All non-structural fasteners are galvanized or zinc-plated carbon steel or stainless steel.

Finish - Standard finishes are either Galvanized (GV) or Finish Painted (FP). Additional finish options including Finish Paint over Galvanizing (FPGV) or any of the V-PRO™ Finish Coating Systems are available upon request. See the product ordering code for color options.

Design Criteria - Please reference Design Criteria Specification for appropriate design conditions.

ROUND TAPERED STEEL DS210
Light Duty

valmont STRUCTURES

Job Name: _____ Client Name: _____

Job Location - City: _____ State: _____ Created By: _____ Date: _____

Product: _____ Quote: _____ Customer Approval: _____ Date: _____

DESIGNATION, LOAD AND DIMENSIONAL DATA

DESIGN INFORMATION							POLE DIMENSIONS				DESIGNATION
	80 MPH w/1.3 GUST		90 MPH w/1.3 GUST		100 MPH w/1.3 GUST						
NOMINAL MOUNTING HEIGHT	MAX EPA[1] (SQ FT)	MAX WEIGHT[1] (LBS)	MAX EPA[1] (SQ FT)	MAX WEIGHT[1] (LBS)	MAX EPA[1] (SQ FT)	MAX WEIGHT[1] (LBS)	BASE OD (IN)	TOP OD (IN)	WALL THK (GA)	STRUCTURE WEIGHT[2] (LBS)	
20'-0"	19.3	482	15.1	377	12.2	305	5.90	3.10	11	140	590A200
	24.2	605	19.3	482	15.6	390	6.50	3.70	11	160	650A200
25'-0"	12.5	312	9.9	247	8.0	200	5.90	2.40	11	155	590A250
	20.3	507	16.2	405	13.1	327	7.00	3.50	11	200	700A250
	30.5	760	24.0	625	19.8	495	7.00	3.50	7	280	700E250
30'-0"	11.7	292	9.3	232	7.5	187	6.60	2.40	11	200	660A300
	18.9	473	14.9	373	12.0	300	8.00	3.80	11	265	800A300
	33.5	838	27.0	675	22.0	550	8.00	3.80	7	380	800E300
35'-0"	11.2	280	8.9	222	7.1	177	7.30	2.40	11	250	730A350
	18.9	472	15.1	377	12.2	305	8.50	3.60	11	315	850A350
	23.2	580	18.2	455	14.5	363	9.50	4.60	11	370	950A350
39'-0"	10.7	267	8.5	212	6.6	165	7.82	2.40	11	285	782A389
	17.2	430	13.5	338	10.8	270	9.00	3.58	11	355	900A389
	28.5	715	23.0	575	19.0	475	9.00	3.58	7	515	900E389
45'-0"	17.4	435	13.5	338	10.6	265	10.00	3.70	11	450	T00A450
	28.5	715	23.0	575	19.0	475	10.00	3.70	7	650	T00E450
50'-0"	13.2	330	10.6	265	8.3	208	10.00	3.00	11	475	T00A500
	20.5	512	16.5	412	13.6	340	10.00	3.00	7	680	T00E500

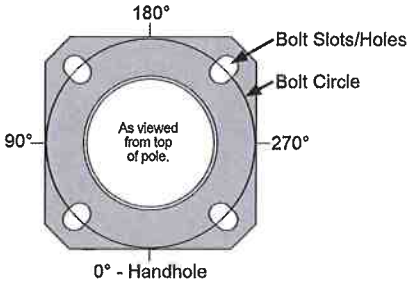
DS210 Heavy Duty poles available at valmontstructures.com

1. Maximum EPA (Effective Projected Area) and weight values are based on top mounted luminaires and/or brackets having a centroid 2'-6" above the Nominal Mounting Height. Variations from sizes above are available upon inquiry at the factory. Satisfactory performance of poles is dependent upon the pole being properly attached to a supporting foundation of adequate design.
2. Structure weight is a nominal value which includes the pole shaft and base plate only.

ANCHORAGE DATA

POLE		BASE PLATE				ANCHOR BOLTS		
		BOLT CIRCLE						
BASE OD (IN)	WALL THK (GA)	DIA (IN)	± (IN)	SQUARE (IN)	THK (IN)	DIA x LENGTH x HOOK (IN)	PROJECTION (IN)	± (IN)
5.90	11	9.00	0.50	10.00	0.875	1.00 x 36.00 x 4.00	4.13	0.25
6.50	11	9.50	0.50	10.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
6.60	11	9.50	0.50	10.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.00	11	10.00	0.50	10.88	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.00	7	10.00	0.50	10.88	1.000	1.00 x 36.00 x 4.00	4.25	0.25
7.30	11	10.50	0.50	11.25	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.82	11	11.00	0.50	11.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
8.00	11	11.00	0.50	11.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
8.00	7	11.00	0.50	11.50	1.250	1.25 x 42.00 x 6.00	5.00	0.25
8.50	11	11.50	0.50	12.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
9.00	11	12.50	0.50	12.38	1.000	1.00 x 36.00 x 4.00	4.25	0.25
9.00	7	12.50	0.50	12.38	1.250	1.25 x 42.00 x 6.00	5.00	0.25
9.50	11	13.00	0.50	13.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
10.00	11	13.50	0.50	14.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
10.00	7	13.50	0.50	14.00	1.250	1.25 x 42.00 x 6.00	5.00	0.25

Anchor Base Detail



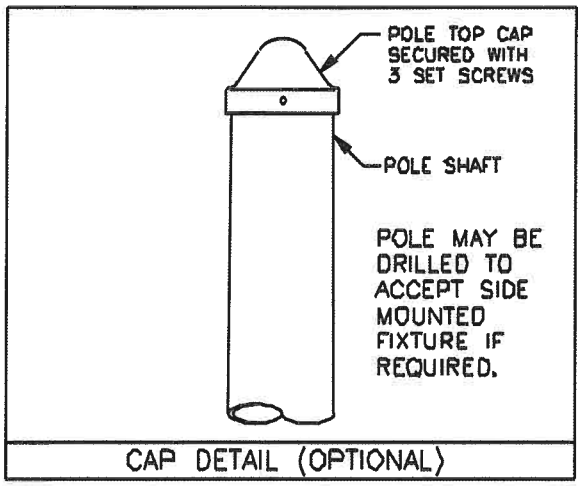
PRODUCT ORDERING CODE

MODEL	DESIGNATION	FIXTURE MOUNTING	FINISH SYSTEM	STANDARD COLOR OPTIONS	BASE COVER	ANCHOR BOLTS	SUPPLEMENTAL INFO
DS210	850A350						
	Select Correct Designation from the *Load and Dimensional Data Chart.*	**Drill Mounting (See Orientation)** D1 = (1) Drilling @ 270° D2 = (2) Drillings @ 90° & 270° D3 = (3) Drillings @ 60°, 180°, & 300° D4 = (4) Drillings @ 0°, 90°, 180°, & 270° D5 = (2) Drillings @ 180° & 270° D6 = (3) Drillings @ 90°, 180°, & 270° **Tenon Mounting** P2 = 2.38" OD x 4" tenon P4 = 4.00" OD x 6" tenon P5 = 2.88" OD x 4" tenon P6 = 2.88" OD x 5" tenon P7 = 2.38" OD x 5" tenon P9 = Special Size (Specify) **Other Options** PC = Pole Cap PL = Plain Top (No Cap)	GV = Galvanized FP = Finish Painted -----OPTIONAL----- FPGV = Finish Paint over Galvanizing VP30 = V-PRO™ 30 System VP32 = V-PRO™ 32 System VP53 = V-PRO™ 53 System VP54 = V-PRO™ 54 System VP57 = V-PRO™ 57 System VP100 = V-PRO™ 100 System VP105 = V-PRO™ 105 System	GV = Galvanized BK = Black DB = Dark Bronze MB = Medium Bronze WH = White LG = Light Gray CB = Bronze DG = Dark Green ST = Sandstone HG = Hunter Green SG = Slate Gray SL = Silver SC = Special Color (Specify)	FBC = Full Base Cover -----OPTIONAL----- NC = Nut Covers 2T = Square Dart Cover DT = Dart Round Cover	AB = With Anchor Bolts LAB = Without Anchor Bolts	

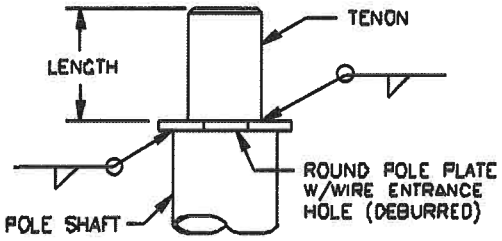
Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES	**Catalog Number:** DS210-850A350-D2-FP-DB-FBC-AB Notes:	**Type:** A LAI19-169707

DS210 Round Tapered

valmont STRUCTURES

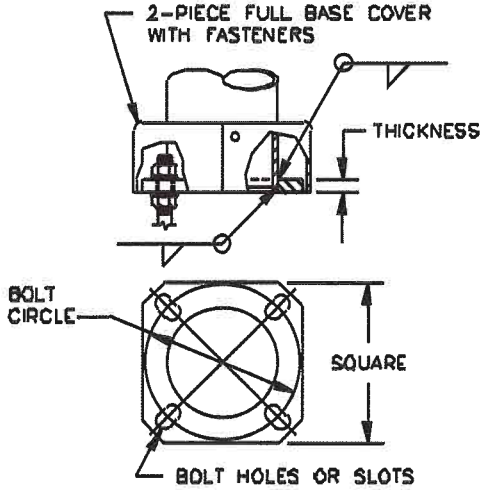


CAP DETAIL (OPTIONAL)

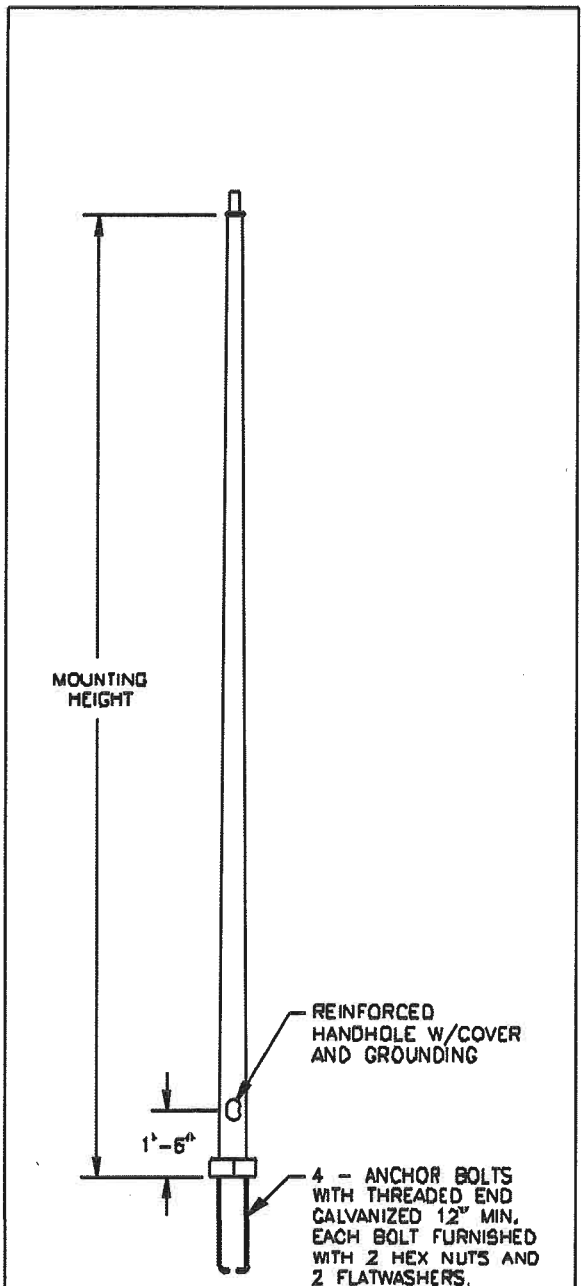


DESIGN NUMBER	O.D. (in)	PIPE SIZE	LENGTH (in)
P2	2.375	2.0" SCHED 80	4
P4	4.000	3.5" SCHED 40	6
PL	2.400	POLE TOP	N.A.

TENON DETAIL (STANDARD)



POLE BASE DETAIL



DS210 POLE DETAIL

SPC7204 02/17 valmontstructures.com carries the most current spec information and supersedes these guidelines.

Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES	**Catalog Number:** DS210-850A350-D2-FP-DB-FBC-AB Notes:	**Type:** A LAI19-169707

ORDERING INFORMATION

Sample Number: GLEON-AF-04-LED-E1-T3-GM-QM

Product Family [1,2]	Light Engine	Number of Light Squares [3]	Lamp Type	Voltage	Distribution	Color	Mounting
GLEON=Galleon	AF=1A Drive Current	01=1 02=2 03=3 04=4 05=5 [4] 06=6 07=7 [5] 08=8 [6] 09=9 [6] 10=10 [6]	LED=Solid State Light Emitting Diodes	E1=120-277V 347=347V [7] 480=480V [7,8]	T2=Type II T2R=Type II Roadway T3=Type III T3R=Type III Roadway T4FT=Type IV Forward Throw T4W=Type IV Wide 5NQ=Type V Narrow 5MQ=Type V Square Medium 5WQ=Type V Square Wide SL2=Type II w/Spill Control SL3=Type III w/Spill Control SL4=Type IV w/Spill Control SLL=90° Spill Light Eliminator Left SLR=90° Spill Light Eliminator Right RW=Rectangular Wide Type I AFL=Automotive Frontline	AP=Grey BZ=Bronze BK=Black DP=Dark Platinum GM=Graphite Metallic WH=White	[Blank]=Arm for Round or Square Pole EA=Extended Arm [9] MA=Mast Arm Adapter [10] WM=Wall Mount QM=Quick Mount Arm (Standard Length) [11] QMEA=Quick Mount Arm (Extended Length) [12]

Options (Add as Suffix)	Accessories (Order Separately)
7030=70 CRI 3000K [13] 8030=80 CRI 3000K [14] 7050=70 CRI 5000K [13] 7060=70 CRI 6000K [13] 600=Drive Current Factory Set to Nominal 600mA [15] 800=Drive Current Factory Set to Nominal 800mA [15] 1200=Drive Current Factory Set to Nominal 1200mA [15,16] F=Single Fuse (120, 277 or 347V. Must Specify Voltage) FF=Double Fuse (208, 240 or 480V. Must Specify Voltage) 2L=Two Circuits [17,18] DIM=External 0-10V Dimming Leads [19,20] P=Button Type Photocontrol (120, 208, 240 or 277V. Must Specify Volatage) [21] PER7=NEMA 7-PIN Twistlock Photocontrol Receptacle [21] R=NEMA Twistlock Photocontrol Receptacle [21] AHD145=After Hours Dim, 5 Hours [22] AHD245=After Hours Dim, 6 Hours [22] AHD255=After Hours Dim, 7 Hours [22] AHD355=After Hours Dim, 8 Hours [22] HA=50°C High Ambient [23] MS/DIM-L08=Motion Sensor for Dimming Operation, Maximum 8' Mounting Height [24,25] MS/DIM-L20=Motion Sensor for Dimming Operation, 9' - 20' Mounting Height [24,26] MS/DIM-L40=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height [22,26] MS/DIM-L40W=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height (Wide Range) [24,28] MS/X-L08=Bi-Level Motion Sensor, Maximum 8' Mounting Height [24,25,29] MS/X-L20=Bi-Level Motion Sensor, 9' - 20' Mounting Height [24,26,29] MS/X-L40=Bi-Level Motion Sensor, 21' - 40' Mounting Height [22,27,29] MS/X-L40W=Bi-Level Motion Sensor, 21' - 40' Mounting Height (Wide Range) [24,28,29] MS-L08=Motion Sensor for ON/OFF Operation, Maximum 8' Mounting Height [24,25] MS-L20=Motion Sensor for ON/OFF Operation, 9' - 20' Mounting Height [24,26] MS-L40=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height [24,27] MS-L40W=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height (Wide Range) [24,28] LWR-LW=LumaWatt Pro Wireless Sensor, Wide Lens for 8' - 16' Mounting Height [30] LWR-LN=LumaWatt Pro Wireless Sensor, Narrow Lens for 16' - 40' Mounting Height [30] L90=Optics Rotated 90° Left R90=Optics Rotated 90° Right MT=Factory Installed Mesh Top TH=Tool-less Door Hardware LCF=Light Square Trim Plate Painted to Match Housing [31] HSS=Factory Installed House Side Shield [32] CE=CE Marking [33]	OA/RA1016=NEMA Photocontrol Multi-Tap - 105-285V OA/RA1027=NEMA Photocontrol - 480V OA/RA1201=NEMA Photocontrol - 347V OA/RA1013=Photocontrol Shorting Cap OA/RA1014=120V Photocontrol MA1252=10kV Surge Module Replacement MA1036-XX=Single Tenon Adapter for 2-3/8" O.D. Tenon MA1037-XX=2@180° Tenon Adapter for 2-3/8" O.D. Tenon MA1197-XX=3@120° Tenon Adapter for 2-3/8" O.D. Tenon MA1188-XX=4@90° Tenon Adapter for 2-3/8" O.D. Tenon MA1189-XX=2@90° Tenon Adapter for 2-3/8" O.D. Tenon MA1190-XX=3@90° Tenon Adapter for 2-3/8" O.D. Tenon MA1191-XX=2@120° Tenon Adapter for 2-3/8" O.D. Tenon MA1038-XX=Single Tenon Adapter for 3-1/2" O.D. Tenon MA1039-XX=2@180° Tenon Adapter for 3-1/2" O.D. Tenon MA1192-XX=3@120° Tenon Adapter for 3-1/2" O.D. Tenon MA1193-XX=4@90° Tenon Adapter for 3-1/2" O.D. Tenon MA1194-XX=2@90° Tenon Adapter for 3-1/2" O.D. Tenon MA1195-XX=3@90° Tenon Adapter for 3-1/2" O.D. Tenon FSIR-100=Wireless Configuration Tool for Occupancy Sensor [24] GLEON-MT1=Field Installed Mesh Top for 1-4 Light Squares GLEON-MT2=Field Installed Mesh Top for 5-6 Light Squares GLEON-MT3=Field Installed Mesh Top for 7-8 Light Squares GLEON-MT4=Field Installed Mesh Top for 9-10 Light Squares GLEON-QM=Quick Mount Arm Kit [10] GLEON-QMEA=Quick Mount Extended Arm Kit [11] LS/HSS=Field Installed House Side Shield [32,34] WOLC-7P-10A=WaveLinx Outdoor Control Module (7-pin) [35]

NOTES:

1. Customer is responsible for engineering analysis to confirm pole and fixture compatibility for all applications. Refer to our white paper WP513001EN for additional support information.
2. DesignLights Consortium® Qualified. Refer to www.designlights.org Qualified Products List under Family Models for details.
3. Standard 4000K CCT and minimum 70 CRI.
4. Not compatible with MS/4-LXX or MS/1-LXX sensors.
5. Not compatible with extended quick mount arm (QMEA).
6. Not compatible with standard quick mount arm (QM) or extended quick mount arm (QMEA).
7. Requires the use of an internal step down transformer when combined with sensor options. Not available with sensor at 1200mA. Not available in combination with the HA high ambient and sensor options at 1A.
8. Only for use with 480V Wye systems. Per NEC, not for use with ungrounded systems, impedance grounded systems or corner grounded systems (commonly known as Three Phase Three Wire Delta, Three Phase High Leg Delta and Three Phase Corner Grounded Delta systems).
9. May be required when two or more luminaires are oriented on a 90° or 120° drilling pattern. Refer to arm mounting requirement table.
10. Factory installed.
11. Maximum 8 light squares.
12. Maximum 6 light squares.
13. Extended lead times apply. Use dedicated IES files for 3000K, 5000K and 6000K when performing layouts. These files are published on the Galleon luminaire product page on the website.
14. Extended lead times apply. Use dedicated IES files for 3000K, 5000K and 6000K when performing layouts. These files are published on the Galleon luminaire product page on the website.
15. 1 Amp standard. Use dedicated IES files for 600mA, 800mA and 1200mA when performing layouts. These files are published on the Galleon luminaire product page on the website.
16. Not available with HA option.
17. 2L is not available with MS, MS/X or MS/DIM at 347V or 480V. 2L in AF-02 through AF-04 requires a larger housing, normally used for AF-05 or AF-06. Extended arm option may be required when mounting two or more fixtures per pole at 90° or 120°. Refer to arm mounting requirement table.
18. Not available with LumaWatt Pro wireless sensors.
19. Cannot be used with other control options.
20. Low voltage control lead brought out 18" outside fixture.
21. Not available if any "MS" sensor is selected. Motion sensor has an integral photocell.
22. Requires the use of P photocontrol or the PER7 or R photocontrol receptacle with photocontrol accessory. See After Hours Dim supplemental guide for additional information.
23. 50°C lumen maintenance data applies to 600mA, 800mA and 1A drive currents.
24. The FSIR-100 configuration tool is required to adjust parameters including high and low modes, sensitivity, time delay, cutoff and more. Consult your lighting representative at Eaton for more information.
25. Approximately 25' detection diameter at 8' mounting height.
26. Approximately 40' detection diameter at 20' mounting height.
27. Approximately 60' detection diameter at 40' mounting height.
28. Approximately 100' detection diameter at 40' mounting height.
29. Replace "X" with number of Light Squares operating in low output mode.
30. LumaWatt Pro wireless sensors are factory installed only requiring network components LWP-EM-1, LWP-GW-1 and LWP-PoE8 in appropriate quantities. See www.eaton.com/lighting for LumaWatt Pro application information.
31. Not available with house side shield (HSS).
32. Only for use with SL2, SL3, SL4 and AFL distributions. The Light Square trim plate is painted black when the HSS option is selected.
33. CE is not available with the LWR, MS, MS/X, MS/DIM, P, R or PER7 options. Available in 120-277V only.
34. One required for each Light Square.
35. Requires 7-pin NEMA twistlock photocontrol receptacle.

EATON
Powering Business Worldwide

Eaton
1121 Highway 74 South
Peachtree City, GA 30269
P: 770-486-4800
www.eaton.com/lighting

Specifications and dimensions subject to change without notice.

Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES	**Catalog Number:** GLEON-AF-03-LED-480-T4W-BZ-MS/DIM-L40W Notes:	**Type:** B LAI19-169707

Submitted by LIGHTING ASSOCIATES

Job Name:
(new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES
Architect: BRIC PARTNERSHIP (BELLEVILLE)
Engineer: OATES AND ASSOCIATES

Catalog Number:
DS210-850A350-D2-FP-DB-FBC-AB

Notes:

Type:
B

LAI19-169707

Poles - Steel | RTS / DS210 | Light Duty

ROUND TAPERED STEEL DS210
Light Duty

valmont STRUCTURES

Job Name: _____ Client Name: _____
Job Location - City: _____ State: _____ Created By: _____ Date: _____
Product: _____ Quote: _____ Customer Approval: _____ Date: _____

DESIGNATION, LOAD AND DIMENSIONAL DATA

DESIGN INFORMATION							POLE DIMENSIONS				DESIGNATION
	80 MPH w/1.3 GUST		90 MPH w/1.3 GUST		100 MPH w/1.3 GUST						
NOMINAL MOUNTING HEIGHT	MAX EPA[1] (SQ.FT)	MAX WEIGHT[1] (LBS)	MAX EPA[1] (SQ.FT)	MAX WEIGHT[1] (LBS)	MAX EPA[1] (SQ.FT)	MAX WEIGHT[1] (LBS)	BASE OD (IN)	TOP OD (IN)	WALL THK (GA)	STRUCTURE WEIGHT[2] (LBS)	
20'-0"	19.3	482	15.1	377	12.2	305	5.90	3.10	11	140	590A200
	24.2	605	19.3	482	15.6	390	6.50	3.70	11	160	650A200
25'-0"	12.5	312	9.9	247	8.0	200	5.90	2.40	11	155	590A250
	20.3	507	16.2	405	13.1	327	7.00	3.50	11	200	700A250
	30.5	760	24.0	625	19.8	495	7.00	3.50	7	280	700E250
30'-0"	11.7	292	9.3	232	7.5	187	6.60	2.40	11	200	660A300
	18.9	473	14.9	373	12.0	300	8.00	3.80	11	265	800A300
	33.5	838	27.0	675	22.0	550	8.00	3.80	7	380	800E300
35'-0"	11.2	280	8.9	222	7.1	177	7.30	2.40	11	250	730A350
	18.9	472	15.1	377	12.2	305	8.50	3.60	11	315	850A350
	23.2	580	18.2	455	14.5	363	9.50	4.60	11	370	950A350
39'-0"	10.7	267	8.5	212	6.6	165	7.82	2.40	11	285	782A389
	17.2	430	13.5	338	10.8	270	9.00	3.58	11	355	900A389
	28.5	715	23.0	575	19.0	475	9.00	3.58	7	515	900E389
45'-0"	17.4	435	13.5	338	10.6	265	10.00	3.70	11	450	T00A450
	28.5	715	23.0	575	19.0	475	10.00	3.70	7	650	T00E450
50'-0"	13.2	330	10.6	265	8.3	208	10.00	3.00	11	475	T00A500
	20.5	512	16.5	412	13.6	340	10.00	3.00	7	680	T00E500

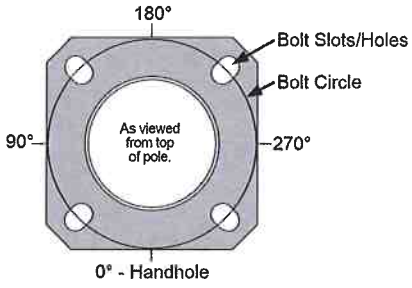
DS210 Heavy Duty poles available at valmontstructures.com

1. Maximum EPA (Effective Projected Area) and weight values are based on top mounted luminaires and/or brackets having a centroid 2'-6" above the Nominal Mounting Height. Variations from sizes above are available upon inquiry at the factory. Satisfactory performance of poles is dependent upon the pole being properly attached to a supporting foundation of adequate design.
2. Structure weight is a nominal value which includes the pole shaft and base plate only.

ANCHORAGE DATA

POLE		BASE PLATE				ANCHOR BOLTS		
		BOLT CIRCLE						
BASE OD (IN)	WALL THK (GA)	DIA (IN)	± (IN)	SQUARE (IN)	THK (IN)	DIA x LENGTH x HOOK (IN)	PROJECTION (IN)	± (IN)
5.90	11	9.00	0.50	10.00	0.875	1.00 x 36.00 x 4.00	4.13	0.25
6.50	11	9.50	0.50	10.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
6.60	11	9.50	0.50	10.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.00	11	10.00	0.50	10.88	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.00	7	10.00	0.50	10.88	1.000	1.00 x 36.00 x 4.00	4.25	0.25
7.30	11	10.50	0.50	11.25	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.82	11	11.00	0.50	11.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
8.00	11	11.00	0.50	11.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
8.00	7	11.00	0.50	11.50	1.250	1.25 x 42.00 x 6.00	5.00	0.25
8.50	11	11.50	0.50	12.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
9.00	11	12.50	0.50	12.38	1.000	1.00 x 36.00 x 4.00	4.25	0.25
9.00	7	12.50	0.50	12.38	1.250	1.25 x 42.00 x 6.00	5.00	0.25
9.50	11	13.00	0.50	13.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
10.00	11	13.50	0.50	14.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
10.00	7	13.50	0.50	14.00	1.250	1.25 x 42.00 x 6.00	5.00	0.25

Anchor Base Detail



PRODUCT ORDERING CODE

MODEL	DESIGNATION	FIXTURE MOUNTING	FINISH SYSTEM	STANDARD COLOR OPTIONS	BASE COVER	ANCHOR BOLTS	SUPPLEMENTAL INFO
DS210	850A350						
	Select Correct Designation from the *Load and Dimensional Data Chart.*	**Drill Mounting (See Orientation)** D1 = (1) Drilling @ 270° D2 = (2) Drillings @ 90° & 270° D3 = (3) Drillings @ 60°, 180°, & 300° D4 = (4) Drillings @ 0°, 90°, 180°, & 270° D5 = (2) Drillings @ 180° & 270° D6 = (3) Drillings @ 90°, 180°, & 270° **Tenon Mounting** P2 = 2.38" OD x 4" tenon P4 = 4.00" OD x 6" tenon P5 = 2.88" OD x 4" tenon P6 = 2.88" OD x 5" tenon P7 = 2.38" OD x 5" tenon P9 = Special Size (Specify) **Other Options** PC = Pole Cap PL = Plain Top (No Cap)	GV = Galvanized FP = Finish Painted -----OPTIONAL----- FPGV = Finish Paint over Galvanizing VP30 = V-PRO™ 30 System VP32 = V-PRO™ 32 System VP53 = V-PRO™ 53 System VP54 = V-PRO™ 54 System VP57 = V-PRO™ 57 System VP100 = V-PRO™ 100 System VP105 = V-PRO™ 105 System	GV = Galvanized BK = Black DB = Dark Bronze MB = Medium Bronze WH = White LG = Light Gray CB = Bronze DG = Dark Green ST = Sandstone HG = Hunter Green SG = Slate Gray SL = Silver SC = Special Color (Specify)	FBC = Full Base Cover -----OPTIONAL----- NC = Nut Covers 2T = Square Dart Cover DT = Dart Round Cover	AB = With Anchor Bolts LAB = Without Anchor Bolts	

Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES	**Catalog Number:** DS210-850A350-D2-FP-DB-FBC-AB Notes:	**Type:** B LAI19-169707

Submitted by LIGHTING ASSOCIATES

Job Name:
(new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES
Architect: BRIC PARTNERSHIP (BELLEVILLE)
Engineer: OATES AND ASSOCIATES

Catalog Number:
GLEON-AF-03-LED-E1-T4W-BZ-MS/DIM-L40W
Notes:

Type:
C
LAI19-169707

ORDERING INFORMATION

Sample Number: GLEON-AF-04-LED-E1-T3-GM-QM

Product Family [1,2]	Light Engine	Number of Light Squares [3]	Lamp Type	Voltage	Distribution	Color	Mounting
GLEON=Galleon	AF=1A Drive Current	01=1 02=2 03=3 04=4 05=5 [4] 06=6 07=7 [5] 08=8 [5] 09=9 [6] 10=10 [6]	LED=Solid State Light Emitting Diodes	E1=120-277V ~~347-347V~~ [7] 480=480V [7,8]	T2=Type II T2R=Type II Roadway T3=Type III T3R=Type III Roadway T4FT=Type IV Forward Throw T4W=Type IV Wide 5NQ=Type V Narrow 5MQ=Type V Square Medium 5WQ=Type V Square Wide SL2=Type II w/Spill Control SL3=Type III w/Spill Control SL4=Type IV w/Spill Control SLL=90° Spill Light Eliminator Left SLR=90° Spill Light Eliminator Right RW=Rectangular Wide Type I AFL=Automotive Frontline	AP=Grey BZ=Bronze BK=Black DP=Dark Platinum GM=Graphite Metallic WH=White	[Blank]=Arm for Round or Square Pole EA=Extended Arm [9] MA=Mast Arm Adapter [10] WM=Wall Mount QM=Quick Mount Arm (Standard Length) [11] QMEA=Quick Mount Arm (Extended Length) [12]

Options (Add as Suffix)

7030=70 CRI 3000K [13]
8030=80 CRI 3000K [14]
7050=70 CRI 5000K [13]
7060=70 CRI 6000K [13]
600=Drive Current Factory Set to Nominal 600mA [15]
800=Drive Current Factory Set to Nominal 800mA [15]
1200=Drive Current Factory Set to Nominal 1200mA [15,16]
F=Single Fuse (120, 277 or 347V. Must Specify Voltage)
FF=Double Fuse (208, 240 or 480V. Must Specify Voltage)
2L=Two Circuits [12,18]
DIM=External 0-10V Dimming Leads [19,20]
P=Button Type Photocontrol (120, 208, 240 or 277V. Must Specify Volatage) [21]
PER7=NEMA 7-PIN Twistlock Photocontrol Receptacle [21]
R=NEMA Twistlock Photocontrol Receptacle [21]
AHD145=After Hours Dim, 5 Hours [22]
AHD245=After Hours Dim, 6 Hours [22]
AHD255=After Hours Dim, 7 Hours [22]
AHD355=After Hours Dim, 8 Hours [22]
HA=50°C High Ambient [23]
MS/DIM-L08=Motion Sensor for Dimming Operation, Maximum 8' Mounting Height [24,25]
MS/DIM-L20=Motion Sensor for Dimming Operation, 9' - 20' Mounting Height [24,26]
MS/DIM-L40=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height [22,26]
MS/DIM-L40W=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height (Wide Range) [24,28]
MS/X-L08=Bi-Level Motion Sensor, Maximum 8' Mounting Height [24,25,29]
MS/X-L20=Bi-Level Motion Sensor, 9' - 20' Mounting Height [24,26,29]
MS/X-L40=Bi-Level Motion Sensor, 21' - 40' Mounting Height [22,27,29]
MS/X-L40W=Bi-Level Motion Sensor, 21' - 40' Mounting Height (Wide Range) [24,28,29]
MS-L08=Motion Sensor for ON/OFF Operation, Maximum 8' Mounting Height [24,25]
MS-L20=Motion Sensor for ON/OFF Operation, 9' - 20' Mounting Height [24,26]
MS-L40=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height [24,27]
MS-L40W=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height (Wide Range) [24,28]
LWR-LW=LumaWatt Pro Wireless Sensor, Wide Lens for 8' - 16' Mounting Height [30]
LWR-LN=LumaWatt Pro Wireless Sensor, Narrow Lens for 16' - 40' Mounting Height [30]
L90=Optics Rotated 90° Left
R90=Optics Rotated 90° Right
MT=Factory Installed Mesh Top
TH=Tool-less Door Hardware
LCF=Light Square Trim Plate Painted to Match Housing [31]
HSS=Factory Installed House Side Shield [32]
CE=CE Marking [33]

Accessories (Order Separately)

OA/RA1016=NEMA Photocontrol Multi-Tap - 105-285V
OA/RA1027=NEMA Photocontrol - 480V
OA/RA1201=NEMA Photocontrol - 347V
OA/RA1013=Photocontrol Shorting Cap
OA/RA1014=120V Photocontrol
MA1252=10kV Surge Module Replacement
MA1036-XX=Single Tenon Adapter for 2-3/8" O.D. Tenon
MA1037-XX=2@180° Tenon Adapter for 2-3/8" O.D. Tenon
MA1197-XX=3@120° Tenon Adapter for 2-3/8" O.D. Tenon
MA1188-XX=4@90° Tenon Adapter for 2-3/8" O.D. Tenon
MA1189-XX=2@90° Tenon Adapter for 2-3/8" O.D. Tenon
MA1190-XX=3@90° Tenon Adapter for 2-3/8" O.D. Tenon
MA1191-XX=2@120° Tenon Adapter for 2-3/8" O.D. Tenon
MA1038-XX=Single Tenon Adapter for 3-1/2" O.D. Tenon
MA1039-XX=2@180° Tenon Adapter for 3-1/2" O.D. Tenon
MA1192-XX=3@120° Tenon Adapter for 3-1/2" O.D. Tenon
MA1193-XX=4@90° Tenon Adapter for 3-1/2" O.D. Tenon
MA1194-XX=2@90° Tenon Adapter for 3-1/2" O.D. Tenon
MA1195-XX=3@90° Tenon Adapter for 3-1/2" O.D. Tenon
FSIR-100=Wireless Configuration Tool for Occupancy Sensor [24]
GLEON-MT1=Field Installed Mesh Top for 1-4 Light Squares
GLEON-MT2=Field Installed Mesh Top for 5-6 Light Squares
GLEON-MT3=Field Installed Mesh Top for 7-8 Light Squares
GLEON-MT4=Field Installed Mesh Top for 9-10 Light Squares
GLEON-QM=Quick Mount Arm Kit [10]
GLEON-QMEA=Quick Mount Extended Arm Kit [11]
LS/HSS=Field Installed House Side Shield [32,34]
WOLC-7P-10A=WaveLinx Outdoor Control Module (7-pin) [35]

NOTES:
1. Customer is responsible for engineering analysis to confirm pole and fixture compatibility for all applications. Refer to our white paper WP513001EN for additional support information.
2. DesignLights Consortium® Qualified. Refer to www.designlights.org Qualified Products List under Family Models for details.
3. Standard 4000K CCT and minimum 70 CRI.
4. Not compatible with MS/4-LXX or MS/1-LXX sensors.
5. Not compatible with extended quick mount arm (QMEA).
6. Not compatible with standard quick mount arm (QM) or extended quick mount arm (QMEA).
7. Requires the use of an internal step down transformer when combined with sensor options. Not available with sensor at 1200mA. Not available in combination with the HA high ambient and sensor options at 1A.
8. Only for use with 480V Wye systems. Per NEC, not for use with ungrounded systems, impedance grounded systems or corner grounded systems (commonly known as Three Phase Three Wire Delta, Three Phase High Leg Delta and Three Phase Corner Grounded Delta systems).
9. May be required when two or more luminaires are oriented on a 90° or 120° drilling pattern. Refer to arm mounting requirement table.
10. Factory installed.
11. Maximum 8 light squares.
12. Maximum 6 light squares.
13. Extended lead times apply. Use dedicated IES files for 3000K, 5000K and 6000K when performing layouts. These files are published on the Galleon luminaire product page on the website.
14. Extended lead times apply. Use dedicated IES files for 3000K, 5000K and 6000K when performing layouts. These files are published on the Galleon luminaire product page on the website.
15. 1 Amp standard. Use dedicated IES files for 600mA, 800mA and 1200mA when performing layouts. These files are published on the Galleon luminaire product page on the website.
16. Not available with HA option.
17. 2L is not available with MS, MS/X or MS/DIM at 347V or 480V. 2L in AF-02 through AF-04 requires a larger housing, normally used for AF-05 or AF-06. Extended arm option may be required when mounting two or more fixtures per pole at 90° or 120°. Refer to arm mounting requirement table.
18. Not available with LumaWatt Pro wireless sensors.
19. Cannot be used with other control options.
20. Low voltage control lead brought out 18" outside fixture.
21. Not available if any "MS" sensor is selected. Motion sensor has an integral photocell.
22. Requires the use of P photocontrol or the PER7 or R photocontrol receptacle with photocontrol accessory. See After Hours Dim supplemental guide for additional information.
23. 50°C lumen maintenance data applies to 600mA, 800mA and 1A drive currents.
24. The FSIR-100 configuration tool is required to adjust parameters including high and low modes, sensitivity, time delay, cutoff and more. Consult your lighting representative at Eaton for more information.
25. Approximately 22' detection diameter at 8' mounting height.
26. Approximately 40' detection diameter at 20' mounting height.
27. Approximately 60' detection diameter at 40' mounting height.
28. Approximately 100' detection diameter at 40' mounting height.
29. Replace X with number of light squares operating in low output mode.
30. LumaWatt Pro wireless sensors are factory installed only requiring network components LWP-EM-1, LWP-GW-1 and LWP-PoE8 in appropriate quantities. See www.eaton.com/lighting for LumaWatt Pro application information.
31. Not available with house side shield (HSS).
32. Only for use with SL2, SL3, SL4 and AFL distributions. The Light Square trim plate is painted black when the HSS option is selected.
33. CE is not available with the LWR, MS, MS/X, MS/DIM, P, R or PER7 options. Available in 120-277V only.
34. One required for each Light Square.
35. Requires 7-pin NEMA twistlock photocontrol receptacle.

EATON
Powering Business Worldwide

Eaton
1121 Highway 74 South
Peachtree City, GA 30269
P: 770-486-4800
www.eaton.com/lighting

Specifications and dimensions subject to change without notice.

Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES	**Catalog Number:** GLEON-AF-03-LED-E1-T4W-BZ-MS/DIM-L40W Notes:	**Type:** C LAI19-169707

Submitted by LIGHTING ASSOCIATES

LIGHTING ASSOCIATES

Job Name:
(new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES
Architect: BRiC PARTNERSHIP (BELLEVILLE)
Engineer: OATES AND ASSOCIATES

Catalog Number:
DS210-850A350-D2-FP-DB-FBC-AB

Notes:

Type:
C

LAI19-169707

Poles - Steel

RTS / DS210

Light Duty

ROUND TAPERED STEEL DS210
Light Duty

valmont STRUCTURES

Job Name: _____ Client Name: _____

Job Location - City: _____ State: _____ Created By: _____ Date: _____

Product: _____ Quote: _____ Customer Approval: _____ Date: _____

DESIGNATION, LOAD AND DIMENSIONAL DATA

DESIGN INFORMATION							POLE DIMENSIONS				DESIGNATION
	80 MPH w/1.3 GUST		90 MPH w/1.3 GUST		100 MPH w/1.3 GUST						
NOMINAL MOUNTING HEIGHT	MAX EPA[1] (SQ FT)	MAX WEIGHT[1] (LBS)	MAX EPA[1] (SQ FT)	MAX WEIGHT[1] (LBS)	MAX EPA[1] (SQ FT)	MAX WEIGHT[1] (LBS)	BASE OD (IN)	TOP OD (IN)	WALL THK (GA)	STRUCTURE WEIGHT[2] (LBS)	
20'-0"	19.3	482	15.1	377	12.2	305	5.90	3.10	11	140	590A200
	24.2	605	19.3	482	15.6	390	6.50	3.70	11	160	650A200
25'-0"	12.5	312	9.9	247	8.0	200	5.90	2.40	11	155	590A250
	20.3	507	16.2	405	13.1	327	7.00	3.50	11	200	700A250
	30.5	760	24.0	625	19.8	495	7.00	3.50	7	280	700E250
30'-0"	11.7	292	9.3	232	7.5	187	6.60	2.40	11	200	660A300
	18.9	473	14.9	373	12.0	300	8.00	3.80	11	265	800A300
	33.5	838	27.0	675	22.0	550	8.00	3.80	7	380	800E300
35'-0"	11.2	280	8.9	222	7.1	177	7.30	2.40	11	250	730A350
	18.9	472	15.1	377	12.2	305	8.50	3.60	11	315	850A350
	23.2	580	18.2	455	14.5	363	9.50	4.60	11	370	950A350
39'-0"	10.7	267	8.5	212	6.6	165	7.82	2.40	11	285	782A389
	17.2	430	13.5	338	10.8	270	9.00	3.58	11	355	900A389
	28.5	715	23.0	575	19.0	475	9.00	3.58	7	515	900E389
45'-0"	17.4	435	13.5	338	10.6	265	10.00	3.70	11	450	T00A450
	28.5	715	23.0	575	19.0	475	10.00	3.70	7	650	T00E450
50'-0"	13.2	330	10.6	265	8.3	208	10.00	3.00	11	475	T00A500
	20.5	512	16.5	412	13.6	340	10.00	3.00	7	680	T00E500

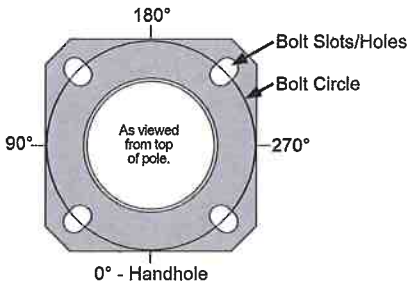
DS210 Heavy Duty poles available at valmontstructures.com

1. Maximum EPA (Effective Projected Area) and weight values are based on top mounted luminaires and/or brackets having a centroid 2'-6" above the Nominal Mounting Height. Variations from sizes above are available upon inquiry at the factory. Satisfactory performance of poles is dependent upon the pole being properly attached to a supporting foundation of adequate design.
2. Structure weight is a nominal value which includes the pole shaft and base plate only.

ANCHORAGE DATA

POLE		BASE PLATE				ANCHOR BOLTS		
		BOLT CIRCLE						
BASE OD (IN)	WALL THK (GA)	DIA (IN)	± (IN)	SQUARE (IN)	THK (IN)	DIA x LENGTH x HOOK (IN)	PROJECTION (IN)	± (IN)
5.90	11	9.00	0.50	10.00	0.875	1.00 x 36.00 x 4.00	4.13	0.25
6.50	11	9.50	0.50	10.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
6.60	11	9.50	0.50	10.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.00	11	10.00	0.50	10.88	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.00	7	10.00	0.50	10.88	1.000	1.00 x 36.00 x 4.00	4.25	0.25
7.30	11	10.50	0.50	11.25	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.82	11	11.00	0.50	11.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
8.00	11	11.00	0.50	11.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
8.00	7	11.00	0.50	11.50	1.250	1.25 x 42.00 x 6.00	5.00	0.25
8.50	11	11.50	0.50	12.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
9.00	11	12.50	0.50	12.38	1.000	1.00 x 36.00 x 4.00	4.25	0.25
9.00	7	12.50	0.50	12.38	1.250	1.25 x 42.00 x 6.00	5.00	0.25
9.50	11	13.00	0.50	13.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
10.00	11	13.50	0.50	14.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
10.00	7	13.50	0.50	14.00	1.250	1.25 x 42.00 x 6.00	5.00	0.25

Anchor Base Detail



PRODUCT ORDERING CODE

MODEL	DESIGNATION	FIXTURE MOUNTING	FINISH SYSTEM	STANDARD COLOR OPTIONS	BASE COVER	ANCHOR BOLTS	SUPPLEMENTAL INFO
DS210	850A350						
	Select Correct Designation from the *Load and Dimensional Data Chart.*	**Drill Mounting (See Orientation)** D1 = (1) Drilling @ 270° D2 = (2) Drillings @ 90° & 270° D3 = (3) Drillings @ 60°, 180°, & 300° D4 = (4) Drillings @ 0°, 90°, 180°, & 270° D5 = (2) Drillings @ 180° & 270° D6 = (3) Drillings @ 90°, 180°, & 270° **Tenon Mounting** P2 = 2.38" OD x 4" tenon P4 = 4.00" OD x 6" tenon P5 = 2.88" OD x 4" tenon P6 = 2.88" OD x 5" tenon P7 = 2.38" OD x 5" tenon P9 = Special Size (Specify) **Other Options** PC = Pole Cap PL = Plain Top (No Cap)	GV = Galvanized FP = Finish Painted -----OPTIONAL----- FPGV = Finish Paint over Galvanizing VP30 = V-PRO™ 30 System VP32 = V-PRO™ 32 System VP53 = V-PRO™ 53 System VP54 = V-PRO™ 54 System VP57 = V-PRO™ 57 System VP100 = V-PRO™ 100 System VP105 = V-PRO™ 105 System	GV = Galvanized BK = Black DB = Dark Bronze MB = Medium Bronze WH = White LG = Light Gray CB = Bronze DG = Dark Green ST = Sandstone HG = Hunter Green SG = Slate Gray SL = Silver SC = Special Color (Specify)	FBC = Full Base Cover -----OPTIONAL----- NC = Nut Covers 2T = Square Dart Cover DT = Dart Round Cover	AB = With Anchor Bolts LAB = Without Anchor Bolts	

Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES	**Catalog Number:** DS210-850A350-D2-FP-DB-FBC-AB Notes:	**Type:** C LAI19-169707

Submitted by LIGHTING ASSOCIATES

LIGHTING ASSOCIATES

Job Name:
(new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES
Architect: BRiC PARTNERSHIP (BELLEVILLE)
Engineer: OATES AND ASSOCIATES

Catalog Number:
GLEON-AF-03-LED-E1-T4W-BZ-MS/DIM-L40W
Notes:

Type:
D
LAI19-169707

ORDERING INFORMATION

Sample Number: GLEON-AF-04-LED-E1-T3-GM-QM

Product Family [1,2]	Light Engine	Number of Light Squares [3]	Lamp Type	Voltage	Distribution	Color	Mounting
GLEON=Galleon	AF=1A Drive Current	01=1 02=2 03=3 04=4 05=5 [4] 06=6 07=7 [5] 08=8 [5] 09=9 [5] 10=10 [6]	LED=Solid State Light Emitting Diodes	E1=120-277V 347=347V [7] 480=480V [7,8]	T2=Type II T2R=Type II Roadway T3=Type III T3R=Type III Roadway T4FT=Type IV Forward Throw T4W=Type IV Wide 5NQ=Type V Narrow 5MQ=Type V Square Medium 5WQ=Type V Square Wide SL2=Type II w/Spill Control SL3=Type III w/Spill Control SL4=Type IV w/Spill Control SLL=90° Spill Light Eliminator Left SLR=90° Spill Light Eliminator Right RW=Rectangular Wide Type I AFL=Automotive Frontline	AP=Grey BZ=Bronze BK=Black DP=Dark Platinum GM=Graphite Metallic WH=White	[Blank]=Arm for Round or Square Pole EA=Extended Arm [9] MA=Mast Arm Adapter [10] WM=Wall Mount QM=Quick Mount Arm (Standard Length) [11] QMEA=Quick Mount Arm (Extended Length) [12]

Options (Add as Suffix)

7030=70 CRI 3000K [13]
8030=80 CRI 3000K [14]
7050=70 CRI 5000K [13]
7060=70 CRI 6000K [13]
600=Drive Current Factory Set to Nominal 600mA [15]
800=Drive Current Factory Set to Nominal 800mA [15]
1200=Drive Current Factory Set to Nominal 1200mA [15,16]
F=Single Fuse (120, 277 or 347V. Must Specify Voltage)
FF=Double Fuse (208, 240 or 480V. Must Specify Voltage)
2L=Two Circuits [17,18]
DIM=External 0-10V Dimming Leads [19,20]
P=Button Type Photocontrol (120, 208, 240 or 277V. Must Specify Voltage) [21]
PER7=NEMA 7-PIN Twistlock Photocontrol Receptacle [21]
R=NEMA Twistlock Photocontrol Receptacle [21]
AHD145=After Hours Dim, 5 Hours [22]
AHD245=After Hours Dim, 6 Hours [22]
AHD255=After Hours Dim, 7 Hours [22]
AHD355=After Hours Dim, 8 Hours [22]
HA=50°C High Ambient [23]
MS/DIM-L08=Motion Sensor for Dimming Operation, Maximum 8' Mounting Height [24,25]
MS/DIM-L20=Motion Sensor for Dimming Operation, 9' - 20' Mounting Height [24,26]
MS/DIM-L40=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height [22,26]
MS/DIM-L40W=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height (Wide Range) [24,28]
MS/X-L08=Bi-Level Motion Sensor, Maximum 8' Mounting Height [24,26,29]
MS/X-L20=Bi-Level Motion Sensor, 9' - 20' Mounting Height [24,26,29]
MS/X-L40=Bi-Level Motion Sensor, 21' - 40' Mounting Height [22,27,29]
MS/X-L40W=Bi-Level Motion Sensor, 21' - 40' Mounting Height (Wide Range) [24,28,29]
MS-L08=Motion Sensor for ON/OFF Operation, Maximum 8' Mounting Height [24,25]
MS-L20=Motion Sensor for ON/OFF Operation, 9' - 20' Mounting Height [24,26]
MS-L40=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height [24,27]
MS-L40W=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height (Wide Range) [24,28]
LWR-LW=LumaWatt Pro Wireless Sensor, Wide Lens for 8' - 16' Mounting Height [30]
LWR-LN=LumaWatt Pro Wireless Sensor, Narrow Lens for 16' - 40' Mounting Height [30]
L90=Optics Rotated 90° Left
R90=Optics Rotated 90° Right
MT=Factory Installed Mesh Top
TH=Tool-less Door Hardware
LCF=Light Square Trim Plate Painted to Match Housing [31]
HSS=Factory Installed House Side Shield [32]
CE=CE Marking [33]

Accessories (Order Separately)

OA/RA1016=NEMA Photocontrol Multi-Tap - 105-285V
OA/RA1027=NEMA Photocontrol - 480V
OA/RA1201=NEMA Photocontrol - 347V
OA/RA1013=Photocontrol Shorting Cap
OA/RA1014=120V Photocontrol
MA1252=10kV Surge Module Replacement
MA1036-XX=Single Tenon Adapter for 2-3/8" O.D. Tenon
MA1037-XX=2@180° Tenon Adapter for 2-3/8" O.D. Tenon
MA1197-XX=3@120° Tenon Adapter for 2-3/8" O.D. Tenon
MA1188-XX=4@90° Tenon Adapter for 2-3/8" O.D. Tenon
MA1189-XX=2@90° Tenon Adapter for 2-3/8" O.D. Tenon
MA1190-XX=3@90° Tenon Adapter for 2-3/8" O.D. Tenon
MA1191-XX=2@120° Tenon Adapter for 2-3/8" O.D. Tenon
MA1038-XX=Single Tenon Adapter for 3-1/2" O.D. Tenon
MA1039-XX=2@180° Tenon Adapter for 3-1/2" O.D. Tenon
MA1192-XX=3@120° Tenon Adapter for 3-1/2" O.D. Tenon
MA1193-XX=4@90° Tenon Adapter for 3-1/2" O.D. Tenon
MA1194-XX=2@90° Tenon Adapter for 3-1/2" O.D. Tenon
MA1195-XX=3@90° Tenon Adapter for 3-1/2" O.D. Tenon
FSIR-100=Wireless Configuration Tool for Occupancy Sensor [24]
GLEON-MT1=Field Installed Mesh Top for 1-4 Light Squares
GLEON-MT2=Field Installed Mesh Top for 5-6 Light Squares
GLEON-MT3=Field Installed Mesh Top for 7-8 Light Squares
GLEON-MT4=Field Installed Mesh Top for 9-10 Light Squares
GLEON-QM=Quick Mount Arm Kit [10]
GLEON-QMEA=Quick Mount Extended Arm Kit [11]
LS/HSS=Field Installed House Side Shield [32,34]
WOLC-7P-10A=WaveLinx Outdoor Control Module (7-pin) [35]

NOTES:
1. Customer is responsible for engineering analysis to confirm pole and fixture compatibility for all applications. Refer to our white paper WP513001EN for additional support information.
2. DesignLights Consortium® Qualified. Refer to www.designlights.org Qualified Products List under Family Models for details.
3. Standard 4000K CCT and minimum 70 CRI.
4. Not compatible with MS/4-LXX or MS/1-LXX sensors.
5. Not compatible with extended quick mount arm (QMEA).
6. Not compatible with standard quick mount arm (QM) or extended quick mount arm (QMEA).
7. Requires the use of an internal step down transformer when combined with sensor options. Not available with sensor at 1200mA. Not available in combination with the HA high ambient and sensor options at 1A.
8. Only for use with 480V Wye systems. Per NEC, not for use with ungrounded systems, impedance grounded systems or corner grounded systems (commonly known as Three Phase Three Wire Delta, Three Phase High Leg Delta and Three Phase Corner Grounded Delta systems).
9. May be required when two or more luminaires are oriented on a 90° or 120° drilling pattern. Refer to arm mounting requirement table.
10. Factory Installed.
11. Maximum 8 light squares.
12. Maximum 6 light squares.
13. Extended lead times apply. Use dedicated IES files for 3000K, 5000K and 6000K when performing layouts. These files are published on the Galleon luminaire product page on the website.
14. Extended lead times apply. Use dedicated IES files for 3000K, 5000K and 6000K when performing layouts. These files are published on the Galleon luminaire product page on the website.
15. 1 Amp standard. Use dedicated IES files for 600mA, 800mA and 1200mA when performing layouts. These files are published on the Galleon luminaire product page on the website.
16. Not available with HA option.
17. 2L is not available with MS, MS/X or MS/DIM at 347V or 480V. 2L in AF-02 through AF-04 requires a larger housing, normally used for AF-05 or AF-06. Extended arm option may be required when mounting two or more fixtures per pole at 90° or 120°. Refer to arm mounting requirement table.
18. Not available with LumaWatt Pro wireless sensors.
19. Cannot be used with other control options.
20. Low voltage control lead brought out 18" outside fixture.
21. Not available if any "MS" sensor is selected. Motion sensor has an integral photocell.
22. Requires the use of P photocontrol or the PER7 or R photocontrol receptacle with photocontrol accessory. See After Hours Dim supplemental guide for additional information.
23. 50°C lumen maintenance data applies to 600mA, 800mA and 1A drive currents.
24. The FSIR-100 configuration tool is required to adjust parameters including high and low modes, sensitivity, time delay, cutoff and more. Consult your lighting representative at Eaton for more information.
25. Approximately 22' detection diameter at 8' mounting height.
26. Approximately 40' detection diameter at 20' mounting height.
27. Approximately 60' detection diameter at 40' mounting height.
28. Approximately 100' detection diameter at 40' mounting height.
29. Replace X with number of Light Squares operating in low output mode.
30. LumaWatt Pro wireless sensors are factory installed only requiring network components LWP-EM-1, LWP-GW-1 and LWP-PoE8 in appropriate quantities. See www.eaton.com/lighting for LumaWatt Pro application information.
31. Not available with house side shield (HSS).
32. Only for use with SL2, SL3, SL4 and AFL distributions. The Light Square trim plate is painted black when the HSS option is selected.
33. CE is not available with the LWR, MS, MS/X, MS/DIM, P, R or PER7 options. Available in 120-277V only.
34. One required for each Light Square.
35. Requires 7-pin NEMA twistlock photocontrol receptacle.

EATON
Powering Business Worldwide

Eaton
1121 Highway 74 South
Peachtree City, GA 30269
P: 770-486-4800
www.eaton.com/lighting

Specifications and dimensions subject to change without notice.

Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES	**Catalog Number:** GLEON-AF-03-LED-E1-T4W-BZ-MS/ DIM-L40W Notes:	**Type:** D LAI19-169707

Submitted by LIGHTING ASSOCIATES

Job Name:
(new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES
Architect: BRiC PARTNERSHIP (BELLEVILLE)
Engineer: OATES AND ASSOCIATES

Catalog Number:
DS210-850A350-D2-FP-DB-FBC-AB

Notes:

Type:
D

LAI19-169707

Poles - Steel | RTS / DS210 | Light Duty

ROUND TAPERED STEEL DS210
Light Duty

valmont STRUCTURES

Job Name: _____ Client Name: _____
Job Location - City: _____ State: _____ Created By: _____ Date: _____
Product: _____ Quote: _____ Customer Approval: _____ Date: _____

DESIGNATION, LOAD AND DIMENSIONAL DATA

DESIGN INFORMATION							POLE DIMENSIONS				DESIGNATION
	80 MPH w/1.3 GUST		90 MPH w/1.3 GUST		100 MPH w/1.3 GUST						
NOMINAL MOUNTING HEIGHT	MAX EPA[1] (SQ FT)	MAX WEIGHT[1] (LBS)	MAX EPA[1] (SQ FT)	MAX WEIGHT[1] (LBS)	MAX EPA[1] (SQ FT)	MAX WEIGHT[1] (LBS)	BASE OD (IN)	TOP OD (IN)	WALL THK (GA)	STRUCTURE WEIGHT[2] (LBS)	
20'-0"	19.3	482	15.1	377	12.2	305	5.90	3.10	11	140	590A200
	24.2	605	19.3	482	15.6	390	6.50	3.70	11	160	650A200
25'-0"	12.5	312	9.9	247	8.0	200	5.90	2.40	11	155	590A250
	20.3	507	16.2	405	13.1	327	7.00	3.50	11	200	700A250
	30.5	760	24.0	625	19.8	495	7.00	3.50	7	280	700E250
30'-0"	11.7	292	9.3	232	7.5	187	6.60	2.40	11	200	660A300
	18.9	473	14.9	373	12.0	300	8.00	3.80	11	265	800A300
	33.5	838	27.0	675	22.0	550	8.00	3.80	7	380	800E300
35'-0"	11.2	280	8.9	222	7.1	177	7.30	2.40	11	250	730A350
	18.9	472	15.1	377	12.2	305	8.50	3.60	11	315	850A350
	23.2	580	18.2	455	14.5	363	9.50	4.60	11	370	950A350
39'-0"	10.7	267	8.5	212	6.6	165	7.82	2.40	11	285	782A389
	17.2	430	13.5	338	10.8	270	9.00	3.58	11	355	900A389
	28.5	715	23.0	575	19.0	475	9.00	3.58	7	515	900E389
45'-0"	17.4	435	13.5	338	10.6	265	10.00	3.70	11	450	T00A450
	28.5	715	23.0	575	19.0	475	10.00	3.70	7	650	T00E450
50'-0"	13.2	330	10.6	265	8.3	208	10.00	3.00	11	475	T00A500
	20.5	512	16.5	412	13.6	340	10.00	3.00	7	680	T00E500

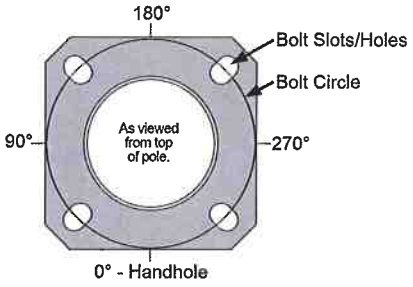
DS210 Heavy Duty poles available at valmontstructures.com

1. Maximum EPA (Effective Projected Area) and weight values are based on top mounted luminaires and/or brackets having a centroid 2'-6" above the Nominal Mounting Height. Variations from sizes above are available upon inquiry at the factory. Satisfactory performance of poles is dependent upon the pole being properly attached to a supporting foundation of adequate design.
2. Structure weight is a nominal value which includes the pole shaft and base plate only.

ANCHORAGE DATA

POLE		BASE PLATE				ANCHOR BOLTS		
		BOLT CIRCLE						
BASE OD (IN)	WALL THK (GA)	DIA (IN)	± (IN)	SQUARE (IN)	THK (IN)	DIA x LENGTH x HOOK (IN)	PROJECTION (IN)	± (IN)
5.90	11	9.00	0.50	10.00	0.875	1.00 x 36.00 x 4.00	4.13	0.25
6.50	11	9.50	0.50	10.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
6.60	11	9.50	0.50	10.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.00	11	10.00	0.50	10.88	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.00	7	10.00	0.50	10.88	1.000	1.00 x 36.00 x 4.00	4.25	0.25
7.30	11	10.50	0.50	11.25	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.82	11	11.00	0.50	11.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
8.00	11	11.00	0.50	11.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
8.00	7	11.00	0.50	11.50	1.250	1.25 x 42.00 x 6.00	5.00	0.25
8.50	11	11.50	0.50	12.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
9.00	11	12.50	0.50	12.38	1.000	1.00 x 36.00 x 4.00	4.25	0.25
9.00	7	12.50	0.50	12.38	1.250	1.25 x 42.00 x 6.00	5.00	0.25
9.50	11	13.00	0.50	13.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
10.00	11	13.50	0.50	14.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
10.00	7	13.50	0.50	14.00	1.250	1.25 x 42.00 x 6.00	5.00	0.25

Anchor Base Detail



PRODUCT ORDERING CODE

MODEL	DESIGNATION	FIXTURE MOUNTING	FINISH SYSTEM	STANDARD COLOR OPTIONS	BASE COVER	ANCHOR BOLTS	SUPPLEMENTAL INFO
DS210	850A350						
	Select Correct Designation from the *Load and Dimensional Data Chart.*	**Drill Mounting (See Orientation)** D1 = (1) Drilling @ 270° D2 = (2) Drillings @ 90° & 270° D3 = (3) Drillings @ 60°, 180°, & 300° D4 = (4) Drillings @ 0°, 90°, 180°, & 270° D5 = (2) Drillings @ 180° & 270° D6 = (3) Drillings @ 90°, 180°, & 270° **Tenon Mounting** P2 = 2.38" OD x 4" tenon P4 = 4.00" OD x 6" tenon P5 = 2.88" OD x 4" tenon P6 = 2.88" OD x 5" tenon P7 = 2.38" OD x 5" tenon P9 = Special Size (Specify) **Other Options** PC = Pole Cap PL = Plain Top (No Cap)	GV = Galvanized FP = Finish Painted -----OPTIONAL----- FPGV = Finish Paint over Galvanizing VP30 = V-PRO™ 30 System VP32 = V-PRO™ 32 System VP53 = V-PRO™ 53 System VP54 = V-PRO™ 54 System VP57 = V-PRO™ 57 System VP100 = V-PRO™ 100 System VP105 = V-PRO™ 105 System	GV = Galvanized BK = Black DB = Dark Bronze MB = Medium Bronze WH = White LG = Light Gray CB = Bronze DG = Dark Green ST = Sandstone HG = Hunter Green SG = Slate Gray SL = Silver SC = Special Color (Specify)	FBC = Full Base Cover -----OPTIONAL----- NC = Nut Covers 2T = Square Dart Cover DT = Dart Round Cover	AB = With Anchor Bolts LAB = Without Anchor Bolts	

Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES	**Catalog Number:** DS210-850A350-D2-FP-DB-FBC-AB Notes:	**Type:** D LAI19-169707

Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES	**Catalog Number:** FSIR-100-PK Notes:	**Type:** TOOL LAI19-169707

WATTSTOPPER | FIXTURE SENSORS & CONTROLS | ACCESSORIES | legrand®

WIRELESS HANDHELD CONFIGURATION TOOL | FSIR-100

Description

The FSIR-100 Wireless IR Configuration Tool is a handheld tool for remote configuration of IR-enabled fixture integrated sensors. The tool enables device modifications via pushbutton, without ladders or tools, and stores up to six sensor parameter profiles to speed configuration of multiple sensors.

Operation

Powered by three AAA batteries, the FSIR-100 features an easy-to-read organic LED (OLED) screen and bi-directional communication with IR-enabled fixture sensors. Its intuitive navigation pad provides a familiar interface for users who can see the current control parameters and make changes by navigating through simple menus. Adjustable sensor parameters include high and low modes, sensitivity, time delay, cut off and more. The FSIR-100 is also used to initiate automatic calibration of the ambient light level setpoint. The setpoint is used to hold the controlled lighting off or at low level when there is sufficient daylight.

IR Communication

The FSIR-100 uses bidirectional IR communication to send and receive sensor settings at mounting heights up to 40 feet. The device can display previously established sensor parameters, copy parameters and send new parameters or stored parameter profiles. For projects where identical settings may be desired across a large number of areas or spaces, this capability provides a streamlined method of configuration. Settings can be copied throughout a site, or in different sites.

Applications

Installers and end users can use the FSIR-100 for initial setup and subsequent sensor adjustement to ensure conformity with design intent. It simplifies changes to sensor settings by making the adjustment process ladder-free. It is compatible with IR-enabled Wattstopper HBP and FSP sensors. These products are ideal for use in parking facilites, gas station, pedestrian pathways and warehouse.

Features

- Establishes high and low mode light levels for 0-10V control
- Sets time delay, cut off time and sensitivity for motion detection
- Enables light level settings for either hold off control or daylighting control
- Initiates automatic setpoint configuration
- Allows ramp up and fade down rate adjustments
- Locks sensor settings to prevent unauthorized changes
- This product meets the materials restrictions of RoHS

PROJECT		LOCATION/ TYPE	

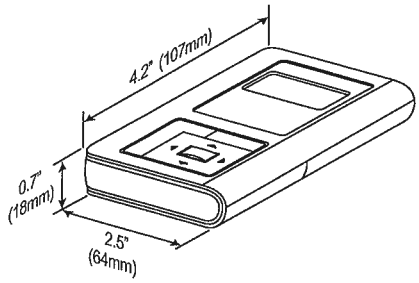
WWW.LEGRAND.US/WATTSTOPPER

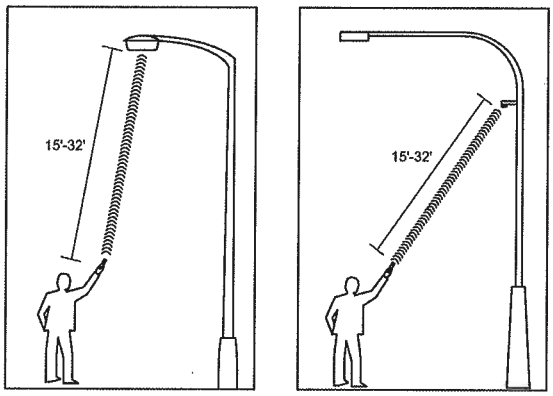
legrand®

Specifications

- Three AAA 1.5 volt batteries (included)
- OLED display 1.4"W x .75"H (36mm x 19mm)
- Infrared (IR) transceiver (36kHz frequency)
- IR range: up to 32' (10m)
- Includes carrying case with belt clip
- Operating temperature: 0-104°F (0-40°C)
- FCC part 15 compliant
- TUV EMC compliant
- Five year warranty

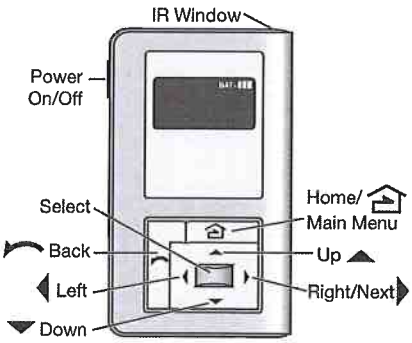
Dimensions & IR Coverage

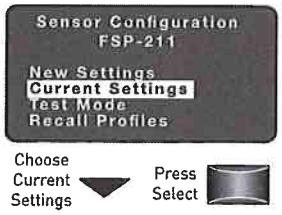




* Distance may vary depending on the lighting environment

Controls & Menus

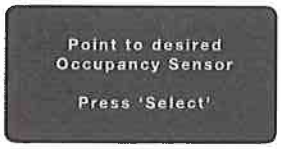




Choose Current Settings

Press Select

Press Select to View More Settings



Point and Press Select

Typical FSIR-100 screens. Complete menu and navigation information is available in the FSIR-100 User Guide.

Ordering Information

Catalog #	Description
☐ FSIR-100	Wireless Handheld Configuration Tool

BRiC PARTNERSHIP, LLC
CONSULTING ENGINEERS

SHOP DRAWING REVIEW

DATE: 4/18/19

TO: Oates Associates

SUBJECT: 265600 Site Lighting

PROJECT: SIUE Korte Stadium/Lot A Reconstruction
Edwardsville, IL 62026

ENGINEER'S REVIEW		RESPONSE REQUIRED OF CONTRACTOR	
☑	No Exception Taken	☐	Confirm Markings
☐	Rejected	☐	Resubmittal Required
☑	Note Markings	☑	No Resubmittal Required

Engineer's review is for general conformance with the design concept and contract documents. Markings and/or comments shall not be construed as relieving the Contractor from compliance with the project plans and specifications, nor departure therefrom. The Contractor remains responsible for details and accuracy, for confirming and correlating all quantities and dimensions, for selecting fabrication processes, for techniques of assembly, and for performing his work in a safe manner. All resubmittals shall have the changed information clearly highlighted by the submitter. Review of resubmittals only applies to the above highlighted information and is not a mechanism for granting approval to items not specifically highlighted.

Signature Zachary Schobert

COMMENTS:

Korte Stadium

- **Type A – No Exception Taken**
- **Type B – No Exception Taken**

Lot A Reconstruction

- **Type A – No Exception Taken. Note:** There are 10 Type A fixtures located between Lot A (6) and P-10 (4). Type A fixture at entry of Lot P-10 shall be on the Full circuit.
- **Type B – No Exception Taken**
- **Type C – No Exception Taken**
- **Type C – No Exception Taken**

J.F. ELECTRIC

Office Location:
100 Lakefront Pkwy
Edwardsville, IL 62025

Mailing Address:
P.O. Box 570
Edwardsville, IL 62025

Main: 618.797.5353
Toll Free: 800.339.8383
Fax: 618.797.5354

jfelectric.com

SUBMITTAL

DATE.....April 18, 2019

PROJECT.....**SIUE KORTE STADIUM/LOT A RECONSTURCTION**
Edwardsville, IL 62026

GENERAL CONTRACTOR.....**RCS Construction**
960 East Airline Drive
East Alton, IL 62024

ARCHITECT.....**Oates Associates**
100 Lanter Court, Suite 1
Collinsville, IL 62234

SUBMITTED BY.....**J. F. ELECTRIC, INCORPORATED**

BRANCH OF WORK.....**ELECTRICAL**

EQUIPMENT.....Site Lighting

SECTION.....265600

J.F. Electric, Inc.
JOB# 219614.06 DATE: 4/18/19 BY: WNB
APPROVED SUBJECT TO:
☐ REQUIREMENTS OF JOB PLANS & SPECS.
☒ APPROVAL OF ENGINEER AND/OR OWNER.
☐ REQUIREMENTS OF OUR PURCHASE ORDER
☐ NOTATIONS MADE HERE ON
Corrections, comments or approvals indicated on this review do not relieve the supplier from the requirements of the Contract Documents. The approval noted is preliminary to the Final Acceptance by the Engineer or Owner and indicates conformance with the specifications as we understand them.

LIGHTING ASSOCIATES
3216 S. BRENTWOOD BLVD.
WEBSTER GROVES MO 63119
Phone: (314) 531-3500
Fax: (314) 531-3737

Date: Apr 18, 2019

Job Name
(new) SIUE KORTE STADIUM - LIGHT FIXTURES
LAI19-169706
EDWARDSVILLE IL

Bid Date
Apr 9, 2019

Submittal Date
Apr 16, 2019

Architect:
BRiC PARTNERSHIP
100 EAST WASHINGTON
BELLEVILLE IL 62220

Engineer:
OATES AND ASSOCIATES
100 LANTER COURT, SUITE 1
COLLINSVILLE IL

Date: Apr 18, 2019

Transmittal

LIGHTING ASSOCIATES
3216 S. BRENTWOOD BLVD.
WEBSTER GROVES MO 63119
Phone: (314) 531-3500
From: Tyler Woldridge

Project **(new) SIUE KORTE STADIUM - LIGHT FIXTURES**
Quote# LAI19-169706
Location EDWARDSVILLE IL
Contact:

ATTACHED WE ARE SENDING YOU 1 COPY OF THE FOLLOWING ITEM:

☐ Drawings ☐ Specifications Other:
☐ Prints ☐ Information
☐ Plans ☐ Submittals

THESE ARE TRANSMITTED FOR:

☐ Prior Approval ☐ Resubmittal for Approval ☐ Record
☐ Approval ☐ Corrections Bids due on:
☐ Approval as Submitted ☐ Your Use Other:
☐ Approval as Noted ☐ Review and Comment

Qty	Type	MFG	Part
~~4~~ 7	A	MCGRAW	GLEON-AF-03-LED-480-T4W-BZ-MS/ DIM-L40W
~~4~~ 7	A	VALMONT INDUSTRIES, INC.	DS210-850A350-D2-FP-DB-FBC-AB
22	B	MCGRAW	GLEON-AF-03-LED-480-T4W-BZ-MS/ DIM-L40W
11	B	VALMONT INDUSTRIES, INC.	DS210-850A350-D2-FP-DB-FBC-AB
1	TOOL	MCGRAW REMOTE CONFIGURATION TOOL PACKED	FSIR-100-PK

WNB

Submitted by LIGHTING ASSOCIATES

Job Name:
(new) SIUE KORTE STADIUM - LIGHT FIXTURES
Architect: BRiC PARTNERSHIP (BELLEVILLE)
Engineer: OATES AND ASSOCIATES (COLLINSVILLE)

Catalog Number:
GLEON-AF-03-LED-480-T4W-BZ-MS/DIM-L40W
Notes:

Type:
A
LAI19-169706

McGraw-Edison

Catalog #		Type	
Project			
Comments		Date	
Prepared by			

DESCRIPTION

The Galleon™ LED luminaire delivers exceptional performance in a highly scalable, low-profile design. Patented, high-efficiency AccuLED Optics™ system provides uniform and energy conscious illumination to walkways, parking lots, roadways, building areas and security lighting applications. IP66 rated and UL/cUL Listed for wet locations.

SPECIFICATION FEATURES

Construction
Extruded aluminum driver enclosure thermally isolated from Light Squares for optimal thermal performance. Heavy-wall, die-cast aluminum end caps enclose housing and die-cast aluminum heat sinks. A unique, patent pending interlocking housing and heat sink provides scalability with superior structural rigidity. 3G vibration tested and rated. Optional tool-less hardware available for ease of entry into electrical chamber. Housing is IP66 rated.

Optics
Patented, high-efficiency injection-molded AccuLED Optics technology. Optics are precisely designed to shape the distribution maximizing efficiency and application spacing. AccuLED Optics create consistent distributions with the scalability to meet customized application requirements. Offered standard in 4000K (+/- 275K) CCT 70 CRI. Optional 3000K, 5000K and 6000K CCT.

Electrical
LED drivers are mounted to removable tray assembly for ease of maintenance. 120-277V 50/60Hz, 347V 60Hz or 480V 60Hz operation. 480V is compatible for use with 480V Wye systems only. Standard with 0-10V dimming. Shipped standard with Eaton proprietary circuit module designed to withstand 10kV of transient line surge. The Galleon LED luminaire is suitable for operation in -40°C to 40°C ambient environments. For applications with ambient temperatures exceeding 40°C, specify the HA (High Ambient) option. Light Squares are IP66 rated. Greater than 90% lumen maintenance expected at 60,000 hours. Available in standard 1A drive current and optional 600mA, 800mA and 1200mA drive currents (nominal).

Mounting
STANDARD ARM MOUNT: Extruded aluminum arm includes internal bolt guides allowing for easy positioning of fixture during mounting. When mounting two or more luminaires at 90° and 120° apart, the EA extended arm may be required. Refer to the arm mounting requirement table. Round pole adapter included. For wall mounting, specify wall mount bracket option. QUICK MOUNT ARM: Adapter is bolted directly to the pole. Quick mount arm slide into place on the adapter and is secured via two screws, facilitating quick and easy installation. The versatile, patent pending, quick mount arm accommodates multiple drill patterns ranging from 1-1/2" to 4-7/8". Removal of the door on the quick mount arm enables wiring of the fixture without having to access the driver compartment. A knock-out enables round pole mounting.

Finish
Housing finished in super durable TGIC polyester powder coat paint, 2.5 mil nominal thickness for superior protection against fade and wear. Heat sink is powder coated black. Standard housing colors include black, bronze, grey, white, dark platinum and graphite metallic. RAL and custom color matches available.

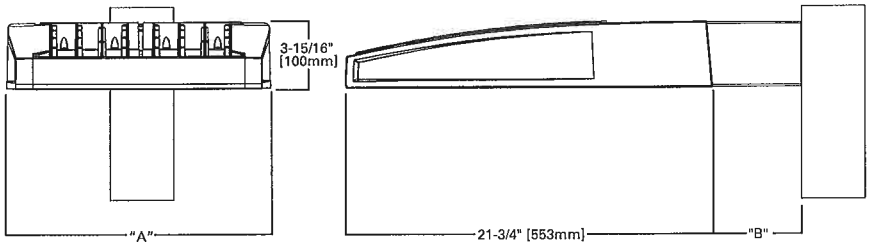
Warranty
Five-year warranty.

GLEON
GALLEON LED

1-10 Light Squares
Solid State LED

AREA/SITE LUMINAIRE

DIMENSIONS



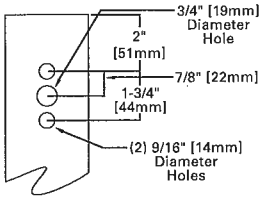
DIMENSION DATA

Number of Light Squares	"A" Width	"B" Standard Arm Length	"B" Optional Arm Length [1]	Weight with Arm (lbs.)	EPA with Arm [2] (Sq. Ft.)
1-4	15-1/2" (394mm)	7" (178mm)	10" (254mm)	33 (15.0 kgs.)	0.96
5-6	21-5/8" (549mm)	7" (178mm)	10" (254mm)	44 (20.0 kgs.)	1.00
7-8	27-5/8" (702mm)	7" (178mm)	13" (330mm)	54 (24.5 kgs.)	1.07
9-10	33-3/4" (857mm)	7" (178mm)	16" (406mm)	63 (28.6 kgs.)	1.12

NOTES: 1. Optional arm length to be used when mounting two fixtures at 90° on a single pole. 2. EPA calculated with optional arm length.

DRILLING PATTERN

TYPE "N"



CERTIFICATION DATA

UL/cUL Wet Location Listed
ISO 9001
LM79 / LM80 Compliant
3G Vibration Rated
IP66 Rated
DesignLights Consortium® Qualified*

ENERGY DATA

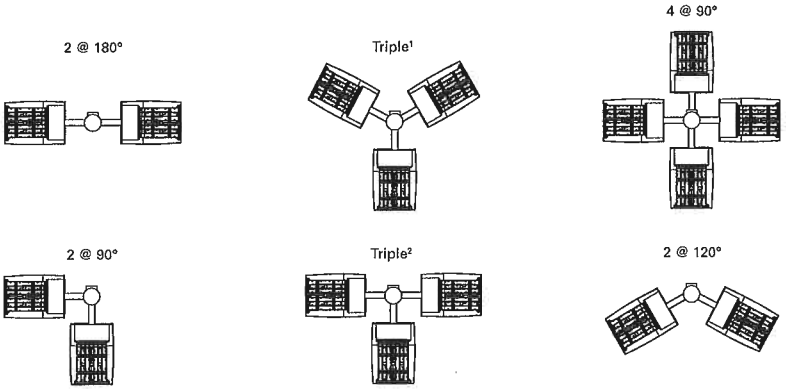
Electronic LED Driver
>0.9 Power Factor
<20% Total Harmonic Distortion
120V-277V 50/60Hz
347V & 480V 60Hz
-40°C Min. Temperature
40°C Max. Temperature
50°C Max. Temperature (HA Option)

*www.designlights.org

TD500020EN
June 21, 2018 4:04 PM

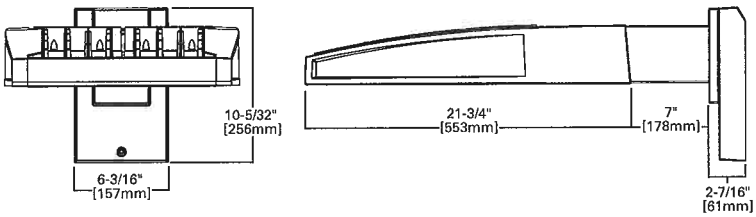
ARM MOUNTING REQUIREMENTS

Configuration	90° Apart	120° Apart
GLEON-AF-01	7" Arm (Standard)	7" Arm (Standard)
GLEON-AF-02	7" Arm (Standard)	7" Arm (Standard)
GLEON-AF-03	7" Arm (Standard)	7" Arm (Standard)
GLEON-AF-04	7" Arm (Standard)	7" Arm (Standard)
GLEON-AF-05	10" Extended Arm (Required)	7" Arm (Standard)
GLEON-AF-06	10" Extended Arm (Required)	7" Arm (Standard)
GLEON-AF-07	13" Extended Arm (Required)	13" Extended Arm (Required)
GLEON-AF-08	13" Extended Arm (Required)	13" Extended Arm (Required)
GLEON-AF-09	16" Extended Arm (Required)	16" Extended Arm (Required)
GLEON-AF-10	16" Extended Arm (Required)	16" Extended Arm (Required)

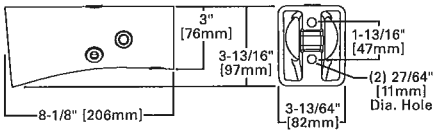


NOTES: 1 Round poles are 3 @ 120°. Square poles are 3 @ 90°. **2** Round poles are 3 @ 90°.

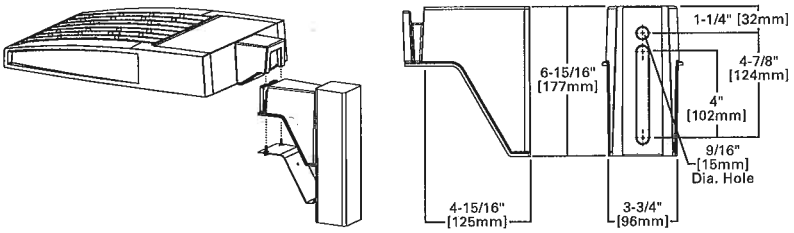
STANDARD WALL MOUNT

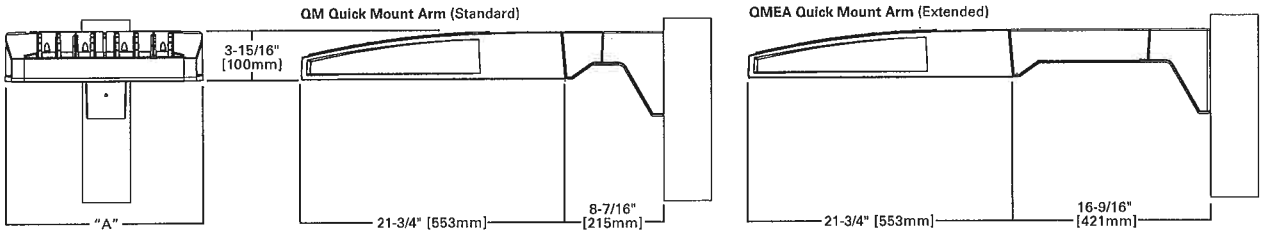


MAST ARM MOUNT



QUICK MOUNT ARM (INCLUDES FIXTURE ADAPTER)



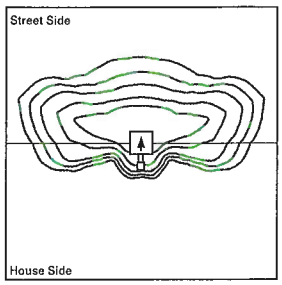


QUICK MOUNT ARM DATA

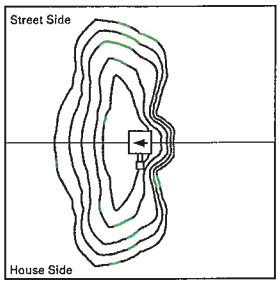
Number of Light Squares [1,2]	"A" Width	Weight with QM Arm (lbs.)	Weight with QMEA Arm (lbs.)	EPA (Sq. Ft.)
1-4	15-1/2" (394mm)	35 (15.91 kgs.)	38 (17.27 kgs.)	1.11
5-6 [3]	21-5/8" (549mm)	46 (20.91 kgs.)	49 (22.27 kgs.)	
7-8	27-5/8" (702mm)	56 (25.45 kgs.)	59 (26.82 kgs.)	

NOTES: 1 QM option available with 1-8 light square configurations. **2** QMEA option available with 1-6 light square configurations. **3** QMEA arm to be used when mounting two fixtures at 90° on a single pole.

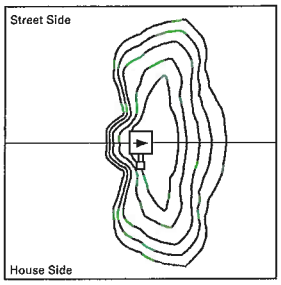
OPTIC ORIENTATION



Standard



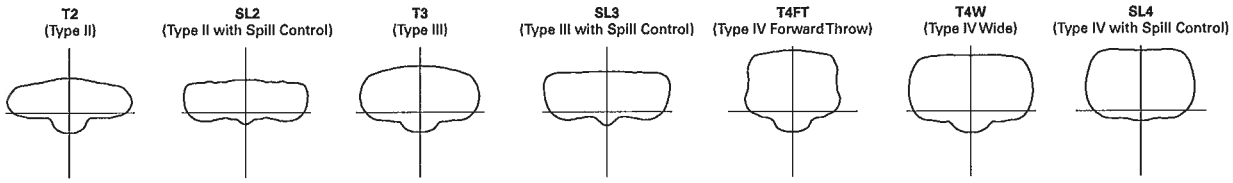
Optics Rotated Left @ 90° [L90]



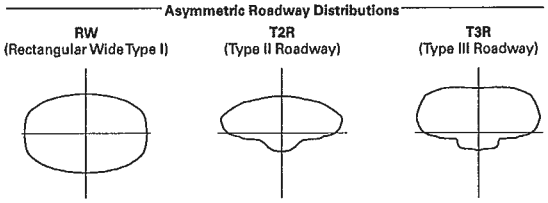
Optics Rotated Right @ 90° [R90]

OPTICAL DISTRIBUTIONS

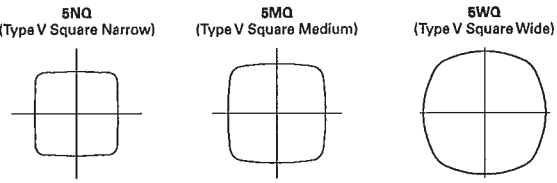
Asymmetric Area Distributions



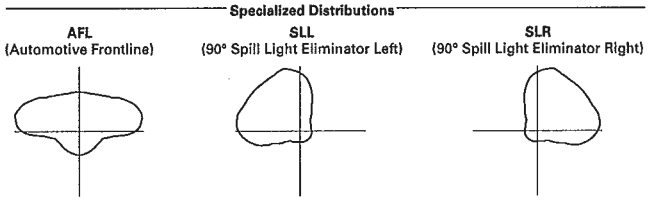
Asymmetric Roadway Distributions



Symmetric Distributions

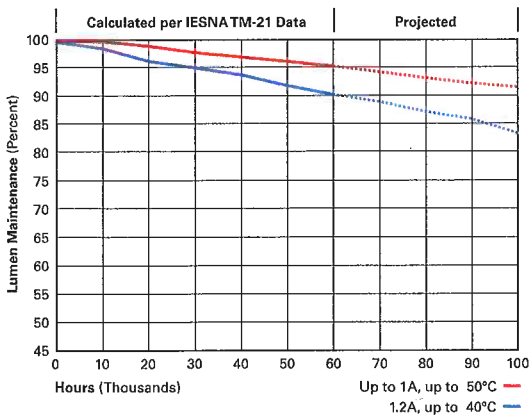


Specialized Distributions



LUMEN MAINTENANCE

Drive Current	Ambient Temperature	TM-21 Lumen Maintenance (60,000 Hours)	Projected L70 (Hours)
Up to 1A	Up to 50°C	> 95%	416,000
1.2A	Up to 40°C	> 90%	205,000



LUMEN MULTIPLIER

Ambient Temperature	Lumen Multiplier
0°C	1.02
10°C	1.01
25°C	1.00
40°C	0.99
50°C	0.97

Powering Business Worldwide

Eaton
1121 Highway 74 South
Peachtree City, GA 30269
P: 770-486-4800
www.eaton.com/lighting

Specifications and dimensions subject to change without notice.

NOMINAL POWER LUMENS (1.2A)

Number of Light Squares		1	2	3	4	5	6	7	8	9	10
Nominal Power (Watts)		67	129	191	258	320	382	448	511	575	640
Input Current @ 120V (A)		0.58	1.16	1.78	2.31	2.94	3.56	4.09	4.71	5.34	5.87
Input Current @ 208V (A)		0.33	0.63	0.93	1.27	1.57	1.87	2.22	2.52	2.8	3.14
Input Current @ 240V (A)		0.29	0.55	0.80	1.10	1.35	1.61	1.93	2.18	2.41	2.71
Input Current @ 277V (A)		0.25	0.48	0.70	0.96	1.18	1.39	1.69	1.90	2.09	2.36
Input Current @ 347V (A)		0.20	0.39	0.57	0.78	0.96	1.15	1.36	1.54	1.72	1.92
Input Current @ 480V (A)		0.15	0.30	0.43	0.60	0.73	0.85	1.03	1.16	1.28	1.45
Optics											
T2	4000K/5000K Lumens	6,709	13,111	19,562	25,848	32,026	38,325	45,324	51,355	57,286	63,424
	3000K Lumens	5,939	11,606	17,316	22,881	28,349	33,925	40,121	45,459	50,710	56,143
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
T2R	4000K/5000K Lumens	7,122	13,919	20,769	27,442	34,000	40,687	48,117	54,519	60,816	67,333
	3000K Lumens	5,939	11,606	17,316	22,881	28,349	33,925	40,121	45,459	50,710	56,143
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
T3	4000K/5000K Lumens	6,838	13,363	19,939	26,346	32,642	39,062	46,196	52,343	58,388	64,646
	3000K Lumens	6,053	11,829	17,650	23,321	28,895	34,578	40,893	46,334	51,685	57,225
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
T3R	4000K/5000K Lumens	6,990	13,660	20,382	26,931	33,368	39,930	47,223	53,506	59,686	66,081
	3000K Lumens	6,188	12,092	18,042	23,839	29,537	35,346	41,802	47,364	52,834	58,495
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
T4FT	4000K/5000K Lumens	6,878	13,440	20,055	26,499	32,832	39,289	46,464	52,646	58,726	65,020
	3000K Lumens	6,088	11,897	17,753	23,457	29,063	34,779	41,130	46,602	51,984	57,556
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
T4W	4000K/5000K Lumens	6,789	13,267	19,795	26,156	32,408	38,781	45,864	51,967	57,968	64,180
	3000K Lumens	6,010	11,744	17,523	23,153	28,688	34,329	40,599	46,001	51,313	56,812
	BUG Rating	B1-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
SL2	4000K/5000K Lumens	6,697	13,088	19,529	25,804	31,970	38,259	45,245	51,267	57,186	63,315
	3000K Lumens	5,928	11,585	17,287	22,842	28,300	33,867	40,051	45,382	50,621	56,046
	BUG Rating	B1-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
SL3	4000K/5000K Lumens	6,837	13,361	19,936	26,342	32,639	39,057	46,189	52,336	58,380	64,636
	3000K Lumens	6,052	11,827	17,647	23,318	28,892	34,573	40,887	46,328	51,678	57,216
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
SL4	4000K/5000K Lumens	6,496	12,695	18,943	25,029	31,011	37,110	43,886	49,727	55,470	61,414
	3000K Lumens	5,750	11,238	16,768	22,156	27,451	32,850	38,848	44,018	49,102	54,364
	BUG Rating	B1-U0-G2	B1-U0-G3	B2-U0-G4	B2-U0-G4	B2-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
5NQ	4000K/5000K Lumens	7,052	13,781	20,564	27,171	33,664	40,285	47,641	53,981	60,215	66,669
	3000K Lumens	6,242	12,199	18,203	24,052	29,799	35,660	42,172	47,784	53,302	59,015
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4
5MQ	4000K/5000K Lumens	7,182	14,034	20,942	27,671	34,284	41,027	48,518	54,975	61,323	67,896
	3000K Lumens	6,358	12,423	18,538	24,494	30,348	36,317	42,948	48,664	54,283	60,102
	BUG Rating	B3-U0-G1	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5	B5-U0-G5
5WQ	4000K/5000K Lumens	7,201	14,073	20,998	27,744	34,375	41,136	48,648	55,121	61,487	68,077
	3000K Lumens	6,374	12,457	18,587	24,559	30,429	36,414	43,063	48,793	54,428	60,262
	BUG Rating	B3-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5	B5-U0-G5	B5-U0-G5
SLL/SLR	4000K/5000K Lumens	6,009	11,741	17,519	23,148	28,681	34,321	40,589	45,990	51,301	56,798
	3000K Lumens	5,319	10,393	15,508	20,491	25,388	30,381	35,929	40,710	45,412	50,278
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5
RW	4000K/5000K Lumens	6,989	13,657	20,378	26,925	33,360	39,921	47,211	53,494	59,672	66,066
	3000K Lumens	6,187	12,089	18,039	23,834	29,530	35,338	41,791	47,353	52,822	58,482
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G4
AFL	4000K/5000K Lumens	7,014	13,706	20,452	27,023	33,481	40,066	47,383	53,688	59,888	66,306
	3000K Lumens	6,209	12,133	18,104	23,921	29,637	35,466	41,943	47,525	53,013	58,694
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G4	B4-U0-G4	B4-U0-G4

* Nominal data for 70 CRI.

NOMINAL POWER LUMENS (1A)

Number of Light Squares		1	2	3	4	5	6	7	8	9	10
Nominal Power (Watts)		59	113	166	225	279	333	391	445	501	558
Input Current @ 120V (A)		0.51	1.02	1.53	2.03	2.55	3.06	3.56	4.08	4.6	5.07
Input Current @ 208V (A)		0.29	0.56	0.82	1.11	1.37	1.64	1.93	2.19	2.46	2.75
Input Current @ 240V (A)		0.26	0.48	0.71	0.96	1.19	1.41	1.67	1.89	2.12	2.39
Input Current @ 277V (A)		0.23	0.42	0.61	0.83	1.03	1.23	1.45	1.65	1.84	2.09
Input Current @ 347V (A)		0.17	0.32	0.50	0.64	0.82	1.00	1.14	1.32	1.50	1.68
Input Current @ 480V (A)		0.14	0.24	0.37	0.48	0.61	0.75	0.91	0.99	1.12	1.28
Optics											
T2	4000K/5000K Lumens	6,116	11,951	17,833	23,563	29,195	34,937	41,317	46,814	52,221	57,817
	3000K Lumens	5,414	10,579	15,786	20,858	25,843	30,926	36,574	41,440	46,226	51,180
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
T2R	4000K/5000K Lumens	6,493	12,688	18,932	25,015	30,994	37,090	43,863	49,699	55,439	61,380
	3000K Lumens	5,748	11,231	16,759	22,143	27,436	32,832	38,828	43,994	49,075	54,334
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5
T3	4000K/5000K Lumens	6,234	12,181	18,176	24,017	29,756	35,609	42,111	47,715	53,225	58,930
	3000K Lumens	5,518	10,783	16,089	21,260	26,340	31,521	37,277	42,237	47,115	52,165
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
T3R	4000K/5000K Lumens	6,372	12,453	18,580	24,550	30,418	36,400	43,048	48,776	54,409	60,239
	3000K Lumens	5,640	11,023	16,447	21,732	26,926	32,221	38,106	43,177	48,163	53,324
	BUG Rating	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5
T4FT	4000K/5000K Lumens	6,270	12,252	18,282	24,156	29,929	35,815	42,356	47,992	53,534	59,271
	3000K Lumens	5,550	10,845	16,183	21,383	26,493	31,703	37,494	42,483	47,388	52,467
	BUG Rating	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
T4W	4000K/5000K Lumens	6,189	12,094	18,045	23,844	29,543	35,352	41,809	47,372	52,843	58,506
	3000K Lumens	5,479	10,706	15,973	21,107	26,151	31,294	37,009	41,934	46,777	51,790
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
SL2	4000K/5000K Lumens	6,105	11,931	17,803	23,522	29,144	34,877	41,245	46,734	52,130	57,717
	3000K Lumens	5,404	10,561	15,759	20,822	25,798	30,873	36,510	41,369	46,145	51,091
	BUG Rating	B1-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
SL3	4000K/5000K Lumens	6,233	12,180	18,174	24,013	29,753	35,604	42,106	47,708	53,218	58,921
	3000K Lumens	5,517	10,782	16,088	21,256	26,337	31,517	37,272	42,231	47,109	52,157
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
SL4	4000K/5000K Lumens	5,922	11,572	17,268	22,816	28,269	33,829	40,006	45,330	50,566	55,984
	3000K Lumens	5,242	10,244	15,286	20,197	25,024	29,945	35,413	40,126	44,761	49,557
	BUG Rating	B1-U0-G2	B1-U0-G3	B2-U0-G3	B2-U0-G4	B2-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
5NQ	4000K/5000K Lumens	6,429	12,563	18,746	24,768	30,688	36,723	43,429	49,208	54,891	60,775
	3000K Lumens	5,691	11,121	16,594	21,925	27,165	32,507	38,443	43,559	48,590	53,798
	BUG Rating	B2-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4
5MQ	4000K/5000K Lumens	6,547	12,794	19,090	25,224	31,253	37,400	44,228	50,114	55,902	61,893
	3000K Lumens	5,795	11,325	16,898	22,328	27,665	33,106	39,151	44,361	49,484	54,788
	BUG Rating	B3-U0-G1	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5
5WQ	4000K/5000K Lumens	6,564	12,828	19,141	25,291	31,336	37,499	44,347	50,248	56,051	62,058
	3000K Lumens	5,810	11,355	16,944	22,388	27,739	33,194	39,256	44,480	49,616	54,934
	BUG Rating	B3-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5	B5-U0-G5	B5-U0-G5
SLL/SLR	4000K/5000K Lumens	5,478	10,703	15,970	21,102	26,145	31,286	37,001	41,924	46,765	51,777
	3000K Lumens	4,849	9,474	14,137	18,679	23,144	27,694	32,753	37,111	41,396	45,833
	BUG Rating	B1-U0-G2	B1-U0-G3	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
RW	4000K/5000K Lumens	6,371	12,449	18,576	24,544	30,411	36,392	43,037	48,764	54,396	60,225
	3000K Lumens	5,640	11,020	16,443	21,726	26,920	32,214	38,096	43,166	48,151	53,311
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4
AFL	4000K/5000K Lumens	6,394	12,494	18,644	24,634	30,521	36,524	43,194	48,942	54,593	60,444
	3000K Lumens	5,660	11,060	16,504	21,806	27,017	32,331	38,235	43,323	48,326	53,505
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3	B4-U0-G4	B4-U0-G4

* Nominal data for 70 CRI.

NOMINAL POWER LUMENS (800MA)

Number of Light Squares		1	2	3	4	5	6	7	8	9	10
Nominal Power (Watts)		44	85	124	171	210	249	295	334	374	419
Input Current @ 120V (A)		0.39	0.77	1.13	1.54	1.90	2.26	2.67	3.03	3.39	3.80
Input Current @ 208V (A)		0.22	0.44	0.62	0.88	1.06	1.24	1.50	1.68	1.87	2.12
Input Current @ 240V (A)		0.19	0.38	0.54	0.76	0.92	1.08	1.30	1.46	1.62	1.84
Input Current @ 277V (A)		0.17	0.36	0.47	0.72	0.83	0.95	1.19	1.31	1.42	1.67
Input Current @ 347V (A)		0.15	0.24	0.38	0.49	0.63	0.77	0.87	1.01	1.15	1.52
Input Current @ 480V (A)		0.11	0.18	0.29	0.37	0.48	0.59	0.66	0.77	0.88	0.96
Optics											
T2	4000K/5000K Lumens	4,941	9,656	14,408	19,038	23,588	28,227	33,382	37,823	42,191	46,713
	3000K Lumens	4,374	8,547	12,754	16,852	20,880	24,987	29,550	33,481	37,347	41,350
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B4-U0-G5	B4-U0-G5
T2R	4000K/5000K Lumens	5,246	10,251	15,296	20,211	25,041	29,966	35,439	40,154	44,791	49,592
	3000K Lumens	4,644	9,074	13,540	17,891	22,166	26,526	31,371	35,544	39,649	43,899
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5
T3	4000K/5000K Lumens	5,037	9,842	14,685	19,404	24,041	28,770	34,024	38,551	43,003	47,612
	3000K Lumens	4,459	8,712	12,999	17,176	21,281	25,467	30,118	34,125	38,066	42,146
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5
T3R	4000K/5000K Lumens	5,148	10,061	15,011	19,835	24,576	29,409	34,780	39,408	43,959	48,669
	3000K Lumens	4,557	8,906	13,288	17,558	21,755	26,033	30,787	34,884	38,913	43,082
	BUG Rating	B1-U0-G2	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
T4FT	4000K/5000K Lumens	5,066	9,899	14,770	19,516	24,181	28,936	34,221	38,774	43,252	47,888
	3000K Lumens	4,484	8,763	13,074	17,276	21,405	25,614	30,292	34,323	38,287	42,390
	BUG Rating	B1-U0-G2	B1-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
T4W	4000K/5000K Lumens	5,000	9,771	14,579	19,264	23,869	28,562	33,779	38,274	42,694	47,269
	3000K Lumens	4,426	8,649	12,905	17,052	21,129	25,283	29,901	33,880	37,793	41,843
	BUG Rating	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
SL2	4000K/5000K Lumens	4,933	9,639	14,383	19,005	23,547	28,178	33,324	37,758	42,118	46,632
	3000K Lumens	4,367	8,532	12,732	16,823	20,844	24,943	29,498	33,423	37,283	41,279
	BUG Rating	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5
SL3	4000K/5000K Lumens	5,036	9,841	14,683	19,401	24,039	28,766	34,019	38,546	42,997	47,605
	3000K Lumens	4,458	8,711	12,997	17,174	21,279	25,464	30,114	34,121	38,061	42,140
	BUG Rating	B1-U0-G2	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
SL4	4000K/5000K Lumens	4,784	9,350	13,951	18,434	22,840	27,332	32,323	36,624	40,854	45,232
	3000K Lumens	4,235	8,277	12,349	16,318	20,218	24,194	28,612	32,420	36,164	40,039
	BUG Rating	B1-U0-G2	B1-U0-G3	B1-U0-G3	B2-U0-G4	B2-U0-G4	B2-U0-G5	B2-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
5NQ	4000K/5000K Lumens	5,194	10,150	15,145	20,011	24,794	29,670	35,088	39,757	44,349	49,102
	3000K Lumens	4,598	8,985	13,406	17,714	21,948	26,264	31,060	35,193	39,258	43,465
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G3
5MQ	4000K/5000K Lumens	5,290	10,337	15,424	20,380	25,250	30,217	35,734	40,489	45,165	50,006
	3000K Lumens	4,683	9,150	13,653	18,040	22,351	26,748	31,632	35,841	39,980	44,265
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G4
5WQ	4000K/5000K Lumens	5,304	10,365	15,465	20,434	25,318	30,297	35,830	40,597	45,286	50,139
	3000K Lumens	4,695	9,175	13,690	18,088	22,411	26,819	31,717	35,936	40,087	44,383
	BUG Rating	B3-U0-G1	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5
SLL/SLR	4000K/5000K Lumens	4,426	8,648	12,903	17,049	21,124	25,278	29,894	33,872	37,784	41,832
	3000K Lumens	3,918	7,655	11,422	15,092	18,699	22,376	26,462	29,983	33,446	37,030
	BUG Rating	B1-U0-G2	B1-U0-G2	B2-U0-G3	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
RW	4000K/5000K Lumens	5,147	10,058	15,009	19,830	24,570	29,402	34,771	39,399	43,949	48,658
	3000K Lumens	4,556	8,903	13,286	17,554	21,749	26,027	30,779	34,876	38,904	43,072
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G4
AFL	4000K/5000K Lumens	5,166	10,095	15,063	19,903	24,659	29,509	34,898	39,542	44,108	48,835
	3000K Lumens	4,573	8,936	13,334	17,618	21,828	26,121	30,892	35,003	39,044	43,229
	BUG Rating	B1-U0-G1	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3

* Nominal data for 70 CRI.

NOMINAL POWER LUMENS (600MA)

Number of Light Squares		1	2	3	4	5	6	7	8	9	10
Nominal Power (Watts)		34	66	96	129	162	193	226	257	290	323
Input Current @ 120V (A)		0.30	0.58	0.86	1.16	1.44	1.73	2.03	2.33	2.59	2.89
Input Current @ 208V (A)		0.17	0.34	0.49	0.65	0.84	0.99	1.14	1.30	1.48	1.63
Input Current @ 240V (A)		0.15	0.30	0.43	0.56	0.74	0.87	1.00	1.13	1.30	1.43
Input Current @ 277V (A)		0.14	0.28	0.41	0.52	0.69	0.81	0.93	1.04	1.22	1.33
Input Current @ 347V (A)		0.11	0.19	0.30	0.39	0.49	0.60	0.69	0.77	0.90	0.99
Input Current @ 480V (A)		0.08	0.15	0.24	0.30	0.38	0.48	0.53	0.59	0.71	0.77
Optics											
T2	4000K/5000K Lumens	4,029	7,874	11,749	15,525	19,235	23,019	27,222	30,844	34,406	38,093
	3000K Lumens	3,566	6,970	10,400	13,743	17,027	20,376	24,097	27,303	30,456	33,720
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G4
T2R	4000K/5000K Lumens	4,278	8,360	12,474	16,482	20,421	24,437	28,900	32,745	36,527	40,441
	3000K Lumens	3,787	7,400	11,042	14,590	18,077	21,632	25,582	28,986	32,334	35,798
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4
T3	4000K/5000K Lumens	4,107	8,026	11,976	15,824	19,605	23,461	27,746	31,438	35,068	38,827
	3000K Lumens	3,636	7,105	10,601	14,007	17,354	20,768	24,561	27,829	31,042	34,370
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
T3R	4000K/5000K Lumens	4,198	8,205	12,242	16,175	20,041	23,982	28,363	32,137	35,848	39,689
	3000K Lumens	3,716	7,263	10,837	14,318	17,740	21,229	25,107	28,448	31,733	35,133
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
T4FT	4000K/5000K Lumens	4,131	8,072	12,045	15,915	19,719	23,597	27,907	31,620	35,272	39,052
	3000K Lumens	3,657	7,145	10,662	14,088	17,455	20,888	24,703	27,990	31,223	34,569
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5
T4W	4000K/5000K Lumens	4,077	7,968	11,889	15,710	19,465	23,292	27,546	31,212	34,816	38,547
	3000K Lumens	3,609	7,053	10,524	13,906	17,230	20,618	24,384	27,629	30,819	34,122
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5
SL2	4000K/5000K Lumens	4,022	7,861	11,729	15,498	19,202	22,979	27,175	30,791	34,347	38,028
	3000K Lumens	3,560	6,959	10,383	13,719	16,998	20,341	24,055	27,256	30,404	33,662
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
SL3	4000K/5000K Lumens	4,106	8,025	11,974	15,821	19,603	23,458	27,742	31,433	35,064	38,821
	3000K Lumens	3,635	7,104	10,599	14,005	17,353	20,765	24,557	27,824	31,039	34,364
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G3	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
SL4	4000K/5000K Lumens	3,902	7,624	11,377	15,033	18,626	22,289	26,359	29,867	33,316	36,886
	3000K Lumens	3,454	6,749	10,071	13,307	16,488	19,730	23,333	26,438	29,491	32,651
	BUG Rating	B1-U0-G2	B1-U0-G2	B1-U0-G3	B1-U0-G3	B2-U0-G4	B2-U0-G4	B2-U0-G4	B2-U0-G5	B3-U0-G5	B3-U0-G5
5NQ	4000K/5000K Lumens	4,236	8,277	12,351	16,319	20,219	24,196	28,614	32,422	36,166	40,042
	3000K Lumens	3,750	7,327	10,933	14,446	17,898	21,418	25,328	28,700	32,014	35,445
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G2	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G2	B5-U0-G3	B5-U0-G3
5MQ	4000K/5000K Lumens	4,314	8,429	12,578	16,619	20,591	24,641	29,141	33,019	36,832	40,779
	3000K Lumens	3,819	7,461	11,134	14,711	18,227	21,812	25,796	29,228	32,604	36,098
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4
5WQ	4000K/5000K Lumens	4,325	8,452	12,611	16,664	20,646	24,707	29,219	33,106	36,930	40,888
	3000K Lumens	3,828	7,482	11,163	14,751	18,276	21,871	25,865	29,305	32,690	36,194
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G4
SLL/SLR	4000K/5000K Lumens	3,609	7,052	10,522	13,903	17,226	20,613	24,378	27,622	30,812	34,114
	3000K Lumens	3,195	6,242	9,314	12,307	15,248	18,247	21,579	24,451	27,275	30,198
	BUG Rating	B1-U0-G1	B1-U0-G2	B1-U0-G3	B2-U0-G3	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
RW	4000K/5000K Lumens	4,197	8,202	12,239	16,171	20,036	23,977	28,356	32,129	35,839	39,680
	3000K Lumens	3,715	7,260	10,834	14,315	17,736	21,224	25,101	28,441	31,725	35,125
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3
AFL	4000K/5000K Lumens	4,213	8,232	12,284	16,230	20,109	24,064	28,459	32,246	35,969	39,824
	3000K Lumens	3,729	7,287	10,874	14,367	17,800	21,301	25,192	28,544	31,840	35,252
	BUG Rating	B1-U0-G1	B1-U0-G1	B2-U0-G2	B2-U0-G2	B2-U0-G2	B3-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3

* Nominal data for 70 CRI.

CONTROL OPTIONS

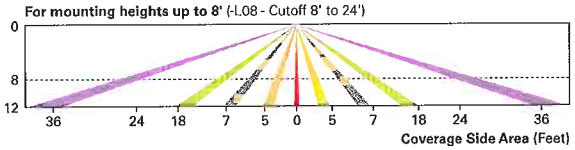
0-10V (DIM)
This fixture is offered standard with 0-10V dimming driver(s). The DIM option provides 0-10V dimming wire leads for use with a lighting control panel or other control method.

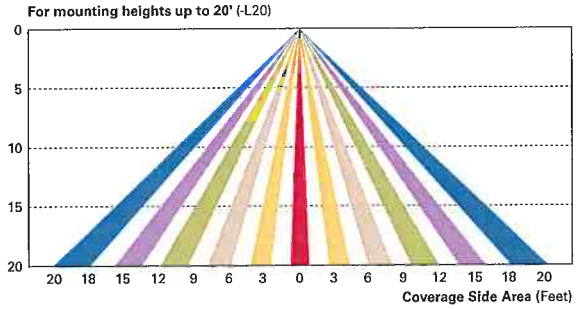
Photocontrol (P, R and PER7)
Optional button-type photocontrol (P) and photocontrol receptacles (R and PER7) provide a flexible solution to enable "dusk-to-dawn" lighting by sensing light levels. Advanced control systems compatible with NEMA 7-pin standards can be utilized with the PER7 receptacle.

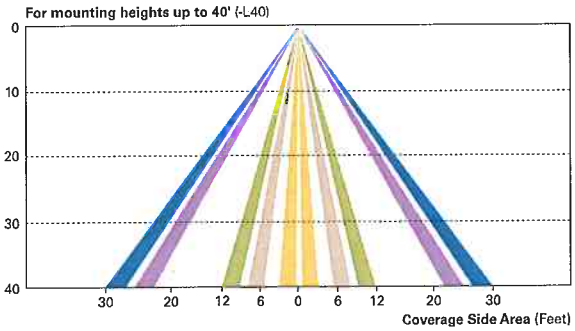
After Hours Dim (AHD)
This feature allows photocontrol-enabled luminaires to achieve additional energy savings by dimming during scheduled portions of the night. The dimming profile will automatically take effect after a "dusk-to-dawn" period has been calculated from the photocontrol input. Specify the desired dimming profile for a simple, factory-shipped dimming solution requiring no external control wiring. Reference the After Hours Dim supplemental guide for additional information.

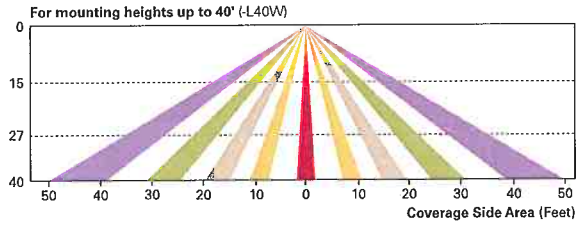
Dimming Occupancy Sensor (MS/DIM-LXX, MS/X-LXX and MS-LXX)
These sensors are factory installed in the luminaire housing. When the MS/DIM-LXX sensor option is selected, the occupancy sensor is connected to a dimming driver and the entire luminaire dims when there is no activity detected. When activity is detected, the luminaire returns to full light output. The MS/DIM sensor is factory preset to dim down to approximately 50 percent power with a time delay of five minutes. The MS-LXX sensor is factory preset to turn the luminaire off after five minutes of no activity. The MS/X-LXX is also preset for five minutes and only controls the specified number of light engines to maintain steady output from the remaining light engines.

These occupancy sensors includes an integral photocell that can be activated with the FSIR-100 accessory for "dusk-to-dawn" control or daylight harvesting - the factory preset is OFF. The FSIR-100 is a wireless tool utilized for changing the dimming level, time delay, sensitivity and other parameters. A variety of sensor lens are available to optimize the coverage pattern for mounting heights from 8'-40'.

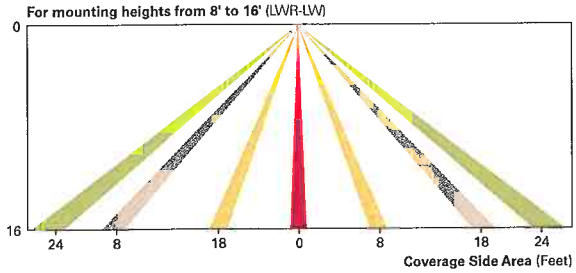


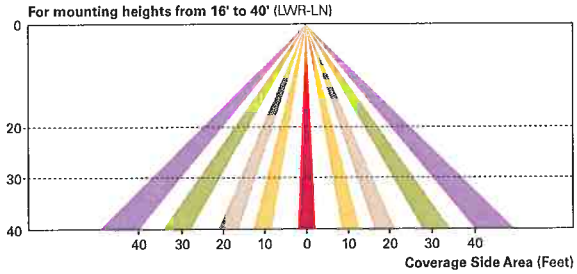






LumaWatt Pro Wireless Control and Monitoring System (LWR-LW and LWR-LN)
The Eaton's LumaWatt Pro powered by Enlighted is a connected lighting solution that combines a broad selection of energy-efficient LED luminaires with a powerful integrated wireless sensor system. The sensor controls the lighting system in compliance with the latest energy codes and collects valuable data about building performance and use. Software applications turn the granular data into information through energy dashboards and specialized apps that make it simple and help optimize the use of building resources, beyond lighting.





WaveLinx Wireless Outdoor Lighting Control Module (WOLC-7P-10A)
The 7-pin wireless outdoor lighting control module enables WaveLinx to control outdoor area, site and flood lighting. WaveLinx controls outdoor lighting using schedules to provide ON, OFF and dimming controls based on astronomic or time schedules based on a 7 day week.

Submitted by LIGHTING ASSOCIATES

LIGHTING ASSOCIATES

Job Name:
(new) SIUE KORTE STADIUM - LIGHT FIXTURES
Architect: BRiC PARTNERSHIP (BELLEVILLE)
Engineer: OATES AND ASSOCIATES (COLLINSVILLE)

Catalog Number:
GLEON-AF-03-LED-480-T4W-BZ-MS/DIM-L40W
Notes:

Type:
A
LAI19-169706

ORDERING INFORMATION

Sample Number: GLEON-AF-04-LED-E1-T3-GM-QM

Product Family [1,2]	Light Engine	Number of Light Squares [3]	Lamp Type	Voltage	Distribution	Color	Mounting
GLEON=Galleon	AF=1A Drive Current	01=1 02=2 03=3 04=4 05=5 [4] 06=6 07=7 [5] 08=8 [5] 09=9 [5] 10=10 [5]	LED=Solid State Light Emitting Diodes	E1=120-277V 347=347V [7] 480=480V [7,8]	T2=Type II T2R=Type II Roadway T3=Type III T3R=Type III Roadway T4FT=Type IV Forward Throw T4W=Type IV Wide 5NQ=Type V Narrow 5MQ=Type V Square Medium 5WQ=Type V Square Wide SL2=Type II w/Spill Control SL3=Type III w/Spill Control SL4=Type IV w/Spill Control SLL=90° Spill Light Eliminator Left SLR=90° Spill Light Eliminator Right RW=Rectangular Wide Type I AFL=Automotive Frontline	AP=Grey BZ=Bronze BK=Black DP=Dark Platinum GM=Graphite Metallic WH=White	[Blank]=Arm for Round or Square Pole EA=Extended Arm [9] MA=Mast Arm Adapter [10] WM=Wall Mount QM=Quick Mount Arm (Standard Length) [11] QMEA=Quick Mount Arm (Extended Length) [12]

Options (Add as Suffix)

7030=70 CRI 3000K [13]
8030=80 CRI 3000K [14]
7050=70 CRI 5000K [13]
7060=70 CRI 6000K [13]
600=Drive Current Factory Set to Nominal 600mA [15]
800=Drive Current Factory Set to Nominal 800mA [15]
1200=Drive Current Factory Set to Nominal 1200mA [15,16]
F=Single Fuse (120, 277 or 347V. Must Specify Voltage)
FF=Double Fuse (208, 240 or 480V. Must Specify Voltage)
2L=Two Circuits [17,18]
DIM=External 0-10V Dimming Leads [19,20]
P=Button Type Photocontrol (120, 208, 240 or 277V. Must Specify Volatage) [21]
PER7=NEMA 7-PIN Twistlock Photocontrol Receptacle [21]
R=NEMA Twistlock Photocontrol Receptacle [21]
AHD145=After Hours Dim, 5 Hours [22]
AHD245=After Hours Dim, 6 Hours [22]
AHD255=After Hours Dim, 7 Hours [22]
AHD355=After Hours Dim, 8 Hours [22]
HA=50°C High Ambient [23]
MS/DIM-L08=Motion Sensor for Dimming Operation, Maximum 8' Mounting Height [24,25]
MS/DIM-L20=Motion Sensor for Dimming Operation, 9' - 20' Mounting Height [24,26]
MS/DIM-L40=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height [22,26]
MS/DIM-L40W=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height (Wide Range) [24,28]
MS/X-L08=Bi-Level Motion Sensor, Maximum 8' Mounting Height [24,25,29]
MS/X-L20=Bi-Level Motion Sensor, 9' - 20' Mounting Height [24,26,29]
MS/X-L40=Bi-Level Motion Sensor, 21' - 40' Mounting Height [22,27,29]
MS/X-L40W=Bi-Level Motion Sensor, 21' - 40' Mounting Height (Wide Range) [24,28,29]
MS-L08=Motion Sensor for ON/OFF Operation, Maximum 8' Mounting Height [24,25]
MS-L20=Motion Sensor for ON/OFF Operation, 9' - 20' Mounting Height [24,26]
MS-L40=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height [24,27]
MS-L40W=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height (Wide Range) [24,28]
LWR-LW=LumaWatt Pro Wireless Sensor, Wide Lens for 8' - 16' Mounting Height [30]
LWR-LN=LumaWatt Pro Wireless Sensor, Narrow Lens for 16' - 40' Mounting Height [30]
L90=Optics Rotated 90° Left
R90=Optics Rotated 90° Right
MT=Factory Installed Mesh Top
TH=Tool-less Door Hardware
LCF=Light Square Trim Plate Painted to Match Housing [31]
HSS=Factory Installed House Side Shield [32]
CE=CE Marking [33]

Accessories (Order Separately)

OA/RA1016=NEMA Photocontrol Multi-Tap - 105-285V
OA/RA1027=NEMA Photocontrol - 480V
OA/RA1201=NEMA Photocontrol - 347V
OA/RA1013=Photocontrol Shorting Cap
OA/RA1014=120V Photocontrol
MA1252=10kV Surge Module Replacement
MA1036-XX=Single Tenon Adapter for 2-3/8" O.D. Tenon
MA1037-XX=2@180° Tenon Adapter for 2-3/8" O.D. Tenon
MA1197-XX=3@120° Tenon Adapter for 2-3/8" O.D. Tenon
MA1188-XX=4@90° Tenon Adapter for 2-3/8" O.D. Tenon
MA1189-XX=2@90° Tenon Adapter for 2-3/8" O.D. Tenon
MA1190-XX=3@90° Tenon Adapter for 2-3/8" O.D. Tenon
MA1191-XX=2@120° Tenon Adapter for 2-3/8" O.D. Tenon
MA1038-XX=Single Tenon Adapter for 3-1/2" O.D. Tenon
MA1039-XX=2@180° Tenon Adapter for 3-1/2" O.D. Tenon
MA1192-XX=3@120° Tenon Adapter for 3-1/2" O.D. Tenon
MA1193-XX=4@90° Tenon Adapter for 3-1/2" O.D. Tenon
MA1194-XX=2@90° Tenon Adapter for 3-1/2" O.D. Tenon
MA1195-XX=3@90° Tenon Adapter for 3-1/2" O.D. Tenon
FSIR-100=Wireless Configuration Tool for Occupancy Sensor [24]
GLEON-MT1=Field Installed Mesh Top for 1-4 Light Squares
GLEON-MT2=Field Installed Mesh Top for 5-6 Light Squares
GLEON-MT3=Field Installed Mesh Top for 7-8 Light Squares
GLEON-MT4=Field Installed Mesh Top for 9-10 Light Squares
GLEON-QM=Quick Mount Arm Kit [10]
GLEON-QMEA=Quick Mount Extended Arm Kit [11]
LS/HSS=Field Installed House Side Shield [32,34]
WOLC-7P-10A=WaveLinx Outdoor Control Module (7-pin) [35]

NOTES:
1. Customer is responsible for engineering analysis to confirm pole and fixture compatibility for all applications. Refer to our white paper WP513001EN for additional support information.
2. DesignLights Consortium® Qualified. Refer to www.designlights.org Qualified Products List under Family Models for details.
3. Standard 4000K CCT and minimum 70 CRI.
4. Not compatible with MS/4-LXX or MS/1-LXX sensors.
5. Not compatible with extended quick mount arm (QMEA).
6. Not compatible with standard quick mount arm (QM) or extended quick mount arm (QMEA).
7. Requires the use of an internal step down transformer when combined with sensor options. Not available with sensor at 1200mA. Not available in combination with the HA high ambient and sensor options at 1A.
8. Only for use with 480V Wye systems. Per NEC, not for use with ungrounded systems, impedance grounded systems or corner grounded systems (commonly known as Three Phase Three Wire Delta, Three Phase High Leg Delta and Three Phase Corner Grounded Delta systems).
9. May be required when two or more luminaires are oriented on a 90° or 120° drilling pattern. Refer to arm mounting requirement table.
10. Factory installed.
11. Maximum 8 light squares.
12. Maximum 6 light squares.
13. Extended lead times apply. Use dedicated IES files for 3000K, 5000K and 6000K when performing layouts. These files are published on the Galleon luminaire product page on the website.
14. Extended lead times apply. Use dedicated IES files for 3000K, 5000K and 6000K when performing layouts. These files are published on the Galleon luminaire product page on the website.
15. 1 Amp standard. Use dedicated IES files for 600mA, 800mA and 1200mA when performing layouts. These files are published on the Galleon luminaire product page on the website.
16. Not available with HA option.
17. 2L is not available with MS, MS/X or MS/DIM at 347V or 480V. 2L in AF-02 through AF-04 requires a larger housing, normally used for AF-05 or AF-06. Extended arm option may be required when mounting two or more fixtures per pole at 90° or 120°. Refer to arm mounting requirement table.
18. Not available with LumaWatt Pro wireless sensors.
19. Cannot be used with other control options.
20. Low voltage control lead brought out 18" outside fixture.
21. Not available if any "MS" sensor is selected. Motion sensor has an integral photocell.
22. Requires the use of P photocontrol or the PER7 or R photocontrol receptacle with photocontrol accessory. See After Hours Dim supplemental guide for additional information.
23. 50°C lumen maintenance data applies to 600mA, 800mA and 1A drive currents.
24. The FSIR-100 configuration tool is required to adjust parameters including high and low modes, sensitivity, time delay, cutoff and more. Consult your lighting representative at Eaton for more information.
25. Approximately 22' detection diameter at 8' mounting height.
26. Approximately 40' detection diameter at 20' mounting height.
27. Approximately 60' detection diameter at 40' mounting height.
28. Approximately 100' detection diameter at 40' mounting height.
29. Replace X with number of Light Squares operating in low output mode.
30. LumaWatt Pro wireless sensors are factory installed only requiring network components LWP-EM-1, LWP-GW-1 and LWP-PoE8 in appropriate quantities. See www.eaton.com/lighting for LumaWatt Pro application information.
31. Not available with house side shield (HSS).
32. Only for use with SL2, SL3, SL4 and AFL distributions. The Light Square trim plate is painted black when the HSS option is selected.
33. CE is not available with the LWR, MS, MS/X, MS/DIM, P, R or PER7 options. Available in 120-277V only.
34. One required for each Light Square.
35. Requires 7-pin NEMA twistlock photocontrol receptacle.

EATON
Powering Business Worldwide

Eaton
1121 Highway 74 South
Peachtree City, GA 30269
P: 770-486-4800
www.eaton.com/lighting

Specifications and dimensions subject to change without notice.

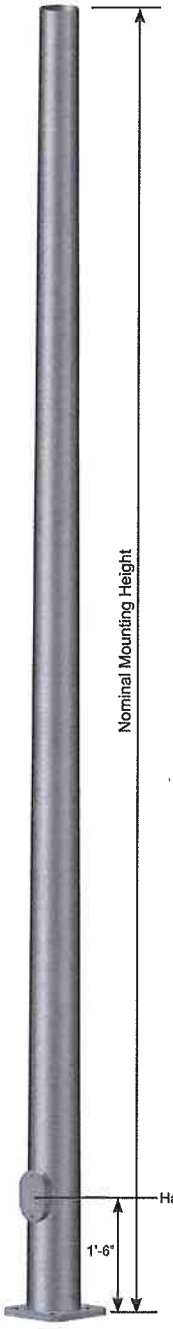
Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE KORTE STADIUM - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES (COLLINSVILLE)	**Catalog Number:** GLEON-AF-03-LED-480-T4W-BZ-MS/DIM-L40W Notes:	**Type:** A LAI19-169706

Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE KORTE STADIUM - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES (COLLINSVILLE)	**Catalog Number:** DS210-850A350-D2-FP-DB-FBC-AB Notes:	**Type:** A LAI19-169706

valmont STRUCTURES

ROUND TAPERED STEEL DS210
Light Duty

Job Name:	Client Name:
Job Location - City: State:	Created By: Date:
Product: Quote:	Customer Approval: Date:



Tenon Top

Pole Cap

Cross Section

Handhole

Full Base Cover (Standard Square)

Dart Square-2T (Optional)

Dart Round - DT (Optional)

SPECIFICATIONS

Pole Shaft - The pole shaft is a 1-piece assembly conforming to ASTM A595 Grade A or A572 Grade 55 with a constant linear taper of 0.14 in/ft.

Pole Top - Pole is provided with either a tenon top or drilled for a fixture mounting. A removable pole cap is provided for drilled poles. Consult the luminaire manufacturer for correct tenon size or drill pattern. Other pole top options include pole cap only (PC) or plain top (PL) which is typical when the pole top diameter matches the necessary slip fit dimensions.

Handhole - A reinforced handhole with grounding provision is provided at 1'-6" from the base end of the pole assembly. Each handhole includes a cover and the cover attachment hardware. Poles with a 5.90" base diameter are supplied with a 3" X 5" rectangular handhole. All other pole assemblies are provided with a 4" X 6.5" ovalized handhole. Handhole dimensions are nominal.

Base Cover - A two-piece full base cover fabricated from ABS plastic is provided with each pole assembly. Valmont reserves the right to provide a two-piece steel full base cover on some applications depending upon the finish requirement and/or pole base diameter. Nut covers can be substituted on most models. Additional base cover options, including the Dart Square (2T) cast aluminum cover and Dart Round (DT) cast aluminum cover, are available upon request.

Anchor Bolts - Anchor bolts conform to ASTM F1554 Grade 55 and are provided with two hex nuts and two flat washers. Bolts have an "L" bend on one end and are galvanized a minimum of 12" on the threaded end.

Hardware - All structural fasteners are galvanized high strength carbon steel. All non-structural fasteners are galvanized or zinc-plated carbon steel or stainless steel.

Finish - Standard finishes are either Galvanized (GV) or Finish Painted (FP). Additional finish options including Finish Paint over Galvanizing (FPGV) or any of the V-PRO™ Finish Coating Systems are available upon request. See the product ordering code for color options.

Design Criteria - Please reference Design Criteria Specification for appropriate design conditions.

Submitted by LIGHTING ASSOCIATES

LIGHTING ASSOCIATES

Job Name:
(new) SIUE KORTE STADIUM - LIGHT FIXTURES
Architect: BRiC PARTNERSHIP (BELLEVILLE)
Engineer: OATES AND ASSOCIATES (COLLINSVILLE)

Catalog Number:
DS210-850A350-D2-FP-DB-FBC-AB

Notes:

Type:
A

LAI19-169706

Poles - Steel | RTS / DS210 | Light Duty

ROUND TAPERED STEEL DS210
Light Duty

valmont STRUCTURES

Job Name: _____ Client Name: _____

Job Location - City: _____ State: _____ Created By: _____ Date: _____

Product: _____ Quote: _____ Customer Approval: _____ Date: _____

DESIGNATION, LOAD AND DIMENSIONAL DATA

DESIGN INFORMATION						POLE DIMENSIONS				DESIGNATION
	80 MPH w/1.3 GUST		90 MPH w/1.3 GUST		100 MPH w/1.3 GUST					
NOMINAL MOUNTING HEIGHT	MAX EPA[1] (SQ.FT)	MAX WEIGHT[1] (LBS)	MAX EPA[1] (SQ.FT)	MAX WEIGHT[1] (LBS)	MAX EPA[1] (SQ.FT)	MAX WEIGHT[1] (LBS)	BASE OD (IN)	TOP OD (IN)	WALL THK (GA)	STRUCTURE WEIGHT[2] (LBS)	
20'-0"	19.3	482	15.1	377	12.2	305	5.90	3.10	11	140	590A200
	24.2	605	19.3	482	15.6	390	6.50	3.70	11	160	650A200
25'-0"	12.5	312	9.9	247	8.0	200	5.90	2.40	11	155	590A250
	20.3	507	16.2	405	13.1	327	7.00	3.50	11	200	700A250
	30.5	760	24.0	625	19.8	495	7.00	3.50	7	280	700E250
30'-0"	11.7	292	9.3	232	7.5	187	6.60	2.40	11	200	660A300
	18.9	473	14.9	373	12.0	300	8.00	3.80	11	265	800A300
	33.5	838	27.0	675	22.0	550	8.00	3.80	7	380	800E300
35'-0"	11.2	280	8.9	222	7.1	177	7.30	2.40	11	250	730A350
	18.9	472	15.1	377	12.2	305	8.50	3.60	11	315	850A350
	23.2	580	18.2	455	14.5	363	9.50	4.60	11	370	950A350
39'-0"	10.7	267	8.5	212	6.6	165	7.82	2.40	11	285	782A389
	17.2	430	13.5	338	10.8	270	9.00	3.58	11	355	900A389
	28.5	715	23.0	575	19.0	475	9.00	3.58	7	515	900E389
45'-0"	17.4	435	13.5	338	10.6	265	10.00	3.70	11	450	T00A450
	28.5	715	23.0	575	19.0	475	10.00	3.70	7	650	T00E450
50'-0"	13.2	330	10.6	265	8.3	208	10.00	3.00	11	475	T00A500
	20.5	512	16.5	412	13.6	340	10.00	3.00	7	680	T00E500

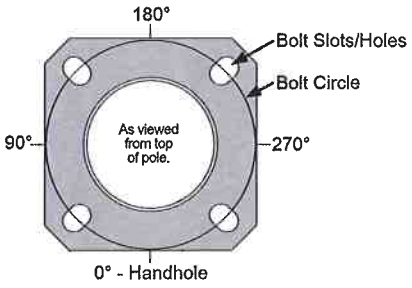
DS210 Heavy Duty poles available at valmontstructures.com

1. Maximum EPA (Effective Projected Area) and weight values are based on top mounted luminaires and/or brackets having a centroid 2'-6" above the Nominal Mounting Height. Variations from sizes above are available upon inquiry at the factory. Satisfactory performance of poles is dependent upon the pole being properly attached to a supporting foundation of adequate design.
2. Structure weight is a nominal value which includes the pole shaft and base plate only.

ANCHORAGE DATA

POLE		BASE PLATE				ANCHOR BOLTS		
		BOLT CIRCLE						
BASE OD (IN)	WALL THK (GA)	DIA (IN)	± (IN)	SQUARE (IN)	THK (IN)	DIA x LENGTH x HOOK (IN)	PROJECTION (IN)	± (IN)
5.90	11	9.00	0.50	10.00	0.875	1.00 x 36.00 x 4.00	4.13	0.25
6.50	11	9.50	0.50	10.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
6.60	11	9.50	0.50	10.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.00	11	10.00	0.50	10.88	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.00	7	10.00	0.50	10.88	1.000	1.00 x 36.00 x 4.00	4.25	0.25
7.30	11	10.50	0.50	11.25	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.82	11	11.00	0.50	11.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
8.00	11	11.00	0.50	11.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
8.00	7	11.00	0.50	11.50	1.250	1.25 x 42.00 x 6.00	5.00	0.25
8.50	11	11.50	0.50	12.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
9.00	11	12.50	0.50	12.38	1.000	1.00 x 36.00 x 4.00	4.25	0.25
9.00	7	12.50	0.50	12.38	1.250	1.25 x 42.00 x 6.00	5.00	0.25
9.50	11	13.00	0.50	13.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
10.00	11	13.50	0.50	14.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
10.00	7	13.50	0.50	14.00	1.250	1.25 x 42.00 x 6.00	5.00	0.25

Anchor Base Detail



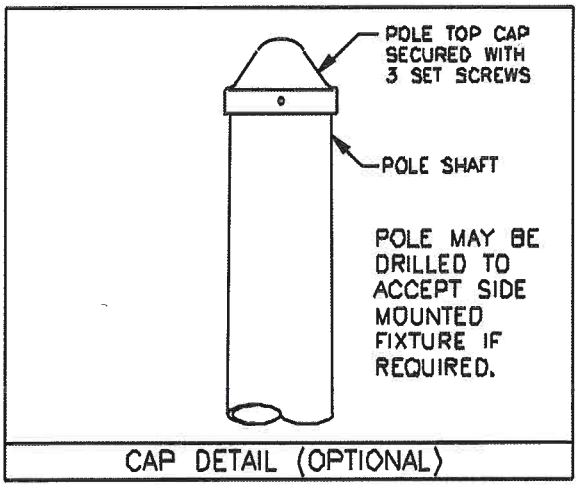
PRODUCT ORDERING CODE

MODEL	DESIGNATION	FIXTURE MOUNTING	FINISH SYSTEM	STANDARD COLOR OPTIONS	BASE COVER	ANCHOR BOLTS	SUPPLEMENTAL INFO
DS210	850A350						
	Select Correct Designation from the *Load and Dimensional Data Chart.*	**Drill Mounting (See Orientation)** D1 = (1) Drilling @ 270° D2 = (2) Drillings @ 90° & 270° D3 = (3) Drillings @ 60°, 180°, & 300° D4 = (4) Drillings @ 0°, 90°, 180°, & 270° D5 = (2) Drillings @ 180° & 270° D6 = (3) Drillings @ 90°, 180°, & 270° **Tenon Mounting** P2 = 2.38" OD x 4" tenon P4 = 4.00" OD x 6" tenon P5 = 2.88" OD x 4" tenon P6 = 2.88" OD x 5" tenon P7 = 2.38" OD x 5" tenon P9 = Special Size (Specify) **Other Options** PC = Pole Cap PL = Plain Top (No Cap)	GV = Galvanized FP = Finish Painted -----OPTIONAL----- FPGV = Finish Paint over Galvanizing VP30 = V-PRO™ 30 System VP32 = V-PRO™ 32 System VP53 = V-PRO™ 53 System VP54 = V-PRO™ 54 System VP57 = V-PRO™ 57 System VP100 = V-PRO™ 100 System VP105 = V-PRO™ 105 System	GV = Galvanized BK = Black DB = Dark Bronze MB = Medium Bronze WH = White LG = Light Gray CB = Bronze DG = Dark Green ST = Sandstone HG = Hunter Green SG = Slate Gray SL = Silver SC = Special Color (Specify)	FBC = Full Base Cover -----OPTIONAL----- NC = Nut Covers 2T = Square Dart Cover DT = Dart Round Cover	AB = With Anchor Bolts LAB = Without Anchor Bolts	

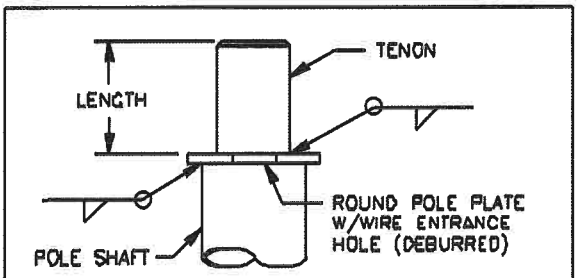
Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE KORTE STADIUM - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES (COLLINSVILLE)	**Catalog Number:** DS210-850A350-D2-FP-DB-FBC-AB Notes:	**Type:** A LAI19-169706

valmont STRUCTURES

DS210 Round Tapered

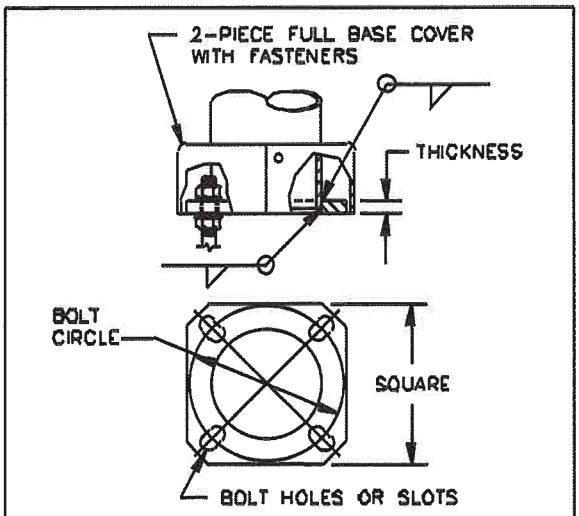


CAP DETAIL (OPTIONAL)

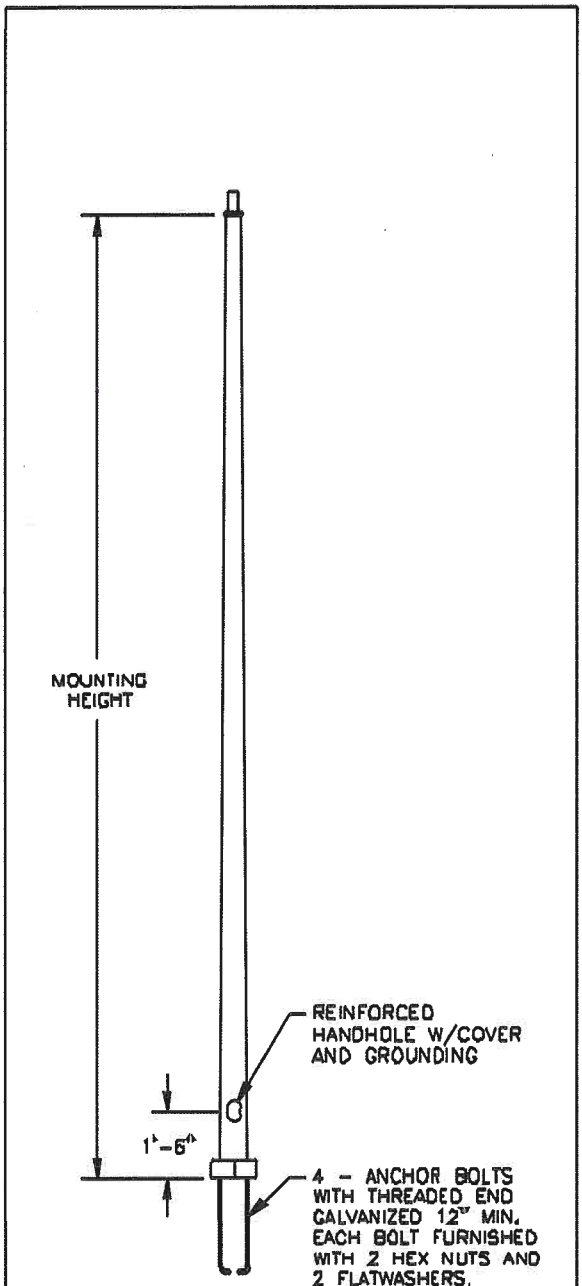


DESIGN NUMBER	O.D. (in)	PIPE SIZE	LENGTH (in)
P2	2.375	2.0" SCHED 80	4
P4	4.000	3.5" SCHED 40	6
PL	2.400	POLE TOP	N.A.

TENON DETAIL (STANDARD)



POLE BASE DETAIL



DS210 POLE DETAIL

SPC7204 02/17 valmontstructures.com carries the most current spec information and supersedes these guidelines.

Submitted by LIGHTING ASSOCIATES

LIGHTING ASSOCIATES

Job Name:
(new) SIUE KORTE STADIUM - LIGHT FIXTURES
Architect: BRiC PARTNERSHIP (BELLEVILLE)
Engineer: OATES AND ASSOCIATES (COLLINSVILLE)

Catalog Number:
GLEON-AF-03-LED-480-T4W-BZ-MS/DIM-L40W
Notes:

Type:
B
LAI19-169706

ORDERING INFORMATION

Sample Number: GLEON-AF-04-LED-E1-T3-GM-QM

Product Family [1,2]	Light Engine	Number of Light Squares [3]	Lamp Type	Voltage	Distribution	Color	Mounting
GLEON=Galleon	AF=1A Drive Current	01=1 02=2 03=3 04=4 05=5 [4] 06=6 07=7 [5] 08=8 [5] 09=9 [6] 10=10 [6]	LED=Solid State Light Emitting Diodes	E1=120-277V 347=347V [7] 480=480V [7,8]	T2=Type II T2R=Type II Roadway T3=Type III T3R=Type III Roadway T4FT=Type IV Forward Throw T4W=Type IV Wide 5NQ=Type V Narrow 5MQ=Type V Square Medium 5WQ=Type V Square Wide SL2=Type II w/Spill Control SL3=Type III w/Spill Control SL4=Type IV w/Spill Control SLL=90° Spill Light Eliminator Left SLR=90° Spill Light Eliminator Right RW=Rectangular Wide Type I AFL=Automotive Frontline	AP=Grey BZ=Bronze BK=Black DP=Dark Platinum GM=Graphite Metallic WH=White	[Blank]=Arm for Round or Square Pole EA=Extended Arm [9] MA=Mast Arm Adapter [10] WM=Wall Mount QM=Quick Mount Arm (Standard Length) [11] QMEA=Quick Mount Arm (Extended Length) [12]

Options (Add as Suffix)	Accessories (Order Separately)
7030=70 CRI 3000K [13] 8030=80 CRI 3000K [14] 7050=70 CRI 5000K [13] 7060=70 CRI 6000K [13] 600=Drive Current Factory Set to Nominal 600mA [15] 800=Drive Current Factory Set to Nominal 800mA [15] 1200=Drive Current Factory Set to Nominal 1200mA [15,16] F=Single Fuse (120, 277 or 347V. Must Specify Voltage) FF=Double Fuse (208, 240 or 480V. Must Specify Voltage) 2L=Two Circuits [17,18] DIM=External 0-10V Dimming Leads [19,20] P=Button Type Photocontrol (120, 208, 240 or 277V. Must Specify Volatage) [21] PER7=NEMA 7-PIN Twistlock Photocontrol Receptacle [21] R=NEMA Twistlock Photocontrol Receptacle [21] AHD145=After Hours Dim, 5 Hours [22] AHD245=After Hours Dim, 6 Hours [22] AHD255=After Hours Dim, 7 Hours [22] AHD355=After Hours Dim, 8 Hours [22] HA=50°C High Ambient [23] MS/DIM-L08=Motion Sensor for Dimming Operation, Maximum 8' Mounting Height [24,25] MS/DIM-L20=Motion Sensor for Dimming Operation, 9' - 20' Mounting Height [24,26] MS/DIM-L40=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height [22,25] MS/DIM-L40W=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height (Wide Range) [24,28] MS/X-L08=Bi-Level Motion Sensor, Maximum 8' Mounting Height [24,26,29] MS/X-L20=Bi-Level Motion Sensor, 9' - 20' Mounting Height [24,26,29] MS/X-L40=Bi-Level Motion Sensor, 21' - 40' Mounting Height [22,27,29] MS/X-L40W=Bi-Level Motion Sensor, 21' - 40' Mounting Height (Wide Range) [24,28,29] MS-L08=Motion Sensor for ON/OFF Operation, Maximum 8' Mounting Height [24,25] MS-L20=Motion Sensor for ON/OFF Operation, 9' - 20' Mounting Height [24,26] MS-L40=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height [24,27] MS-L40W=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height (Wide Range) [24,28] LWR-LW=LumaWatt Pro Wireless Sensor, Wide Lens for 8' - 16' Mounting Height [30] LWR-LN=LumaWatt Pro Wireless Sensor, Narrow Lens for 16' - 40' Mounting Height [30] L90=Optics Rotated 90° Left R90=Optics Rotated 90° Right MT=Factory Installed Mesh Top TH=Tool-less Door Hardware LCF=Light Square Trim Plate Painted to Match Housing [31] HSS=Factory Installed House Side Shield [32] CE=CE Marking [33]	OA/RA1016=NEMA Photocontrol Multi-Tap - 105-285V OA/RA1027=NEMA Photocontrol - 480V OA/RA1201=NEMA Photocontrol - 347V OA/RA1013=Photocontrol Shorting Cap OA/RA1014=120V Photocontrol MA1252=10kV Surge Module Replacement MA1036-XX=Single Tenon Adapter for 2-3/8" O.D. Tenon MA1037-XX=2@180° Tenon Adapter for 2-3/8" O.D. Tenon MA1197-XX=3@120° Tenon Adapter for 2-3/8" O.D. Tenon MA1188-XX=4@90° Tenon Adapter for 2-3/8" O.D. Tenon MA1189-XX=2@90° Tenon Adapter for 2-3/8" O.D. Tenon MA1190-XX=3@90° Tenon Adapter for 2-3/8" O.D. Tenon MA1191-XX=2@120° Tenon Adapter for 2-3/8" O.D. Tenon MA1038-XX=Single Tenon Adapter for 3-1/2" O.D. Tenon MA1039-XX=2@180° Tenon Adapter for 3-1/2" O.D. Tenon MA1192-XX=3@120° Tenon Adapter for 3-1/2" O.D. Tenon MA1193-XX=4@90° Tenon Adapter for 3-1/2" O.D. Tenon MA1194-XX=2@90° Tenon Adapter for 3-1/2" O.D. Tenon MA1195-XX=3@90° Tenon Adapter for 3-1/2" O.D. Tenon FSIR-100=Wireless Configuration Tool for Occupancy Sensor [24] GLEON-MT1=Field Installed Mesh Top for 1-4 Light Squares GLEON-MT2=Field Installed Mesh Top for 5-6 Light Squares GLEON-MT3=Field Installed Mesh Top for 7-8 Light Squares GLEON-MT4=Field Installed Mesh Top for 9-10 Light Squares GLEON-QM=Quick Mount Arm Kit [10] GLEON-QMEA=Quick Mount Extended Arm Kit [11] LS/HSS=Field Installed House Side Shield [32,34] WOLC-7P-10A=WaveLinx Outdoor Control Module (7-pin) [35]

NOTES:
1. Customer is responsible for engineering analysis to confirm pole and fixture compatibility for all applications. Refer to our white paper WP513001EN for additional support information.
2. DesignLights Consortium® Qualified. Refer to www.designlights.org Qualified Products List under Family Models for details.
3. Standard 4000K CCT and minimum 70 CRI.
4. Not compatible with MS/4-LXX or MS/1-LXX sensors.
5. Not compatible with extended quick mount arm (QMEA).
6. Not compatible with standard quick mount arm (QM) or extended quick mount arm (QMEA).
7. Requires the use of an internal step down transformer when combined with sensor options. Not available with sensor at 1200mA. Not available in combination with the HA high ambient and sensor options at 1A.
8. Only for use with 480V Wye systems. Per NEC, not for use with ungrounded systems, impedance grounded systems or corner grounded systems (commonly known as Three Phase Three Wire Delta, Three Phase High Leg Delta and Three Phase Corner Grounded Delta systems).
9. May be required when two or more luminaires are oriented on a 90° or 120° drilling pattern. Refer to arm mounting requirement table.
10. Factory installed.
11. Maximum 8 light squares.
12. Maximum 6 light squares.
13. Extended lead times apply. Use dedicated IES files for 3000K, 5000K and 6000K when performing layouts. These files are published on the Galleon luminaire product page on the website.
14. Extended lead times apply. Use dedicated IES files for 3000K, 5000K and 6000K when performing layouts. These files are published on the Galleon luminaire product page on the website.
15. 1 Amp standard. Use dedicated IES files for 600mA, 800mA and 1200mA when performing layouts. These files are published on the Galleon luminaire product page on the website.
16. Not available with HA option.
17. 2L is not available with MS, MS/X or MS/DIM at 347V or 480V. 2L in AF-02 through AF-04 requires a larger housing, normally used for AF-05 or AF-06. Extended arm option may be required when mounting two or more fixtures per pole at 90° or 120°. Refer to arm mounting requirement table.
18. Not available with LumaWatt Pro wireless sensors.
19. Cannot be used with other control options.
20. Low voltage control lead brought out 18" outside fixture.
21. Not available if any "MS" sensor is selected. Motion sensor has an integral photocell.
22. Requires the use of P photocontrol or the PER7 or R photocontrol receptacle with photocontrol accessory. See After Hours Dim supplemental guide for additional information.
23. 50°C lumen maintenance data applies to 600mA, 800mA and 1A drive currents.
24. The FSIR-100 configuration tool is required to adjust parameters including high and low modes, sensitivity, time delay, cutoff and more. Consult your lighting representative at Eaton for more information.
25. Approximately 22' detection diameter at 8' mounting height.
26. Approximately 40' detection diameter at 20' mounting height.
27. Approximately 60' detection diameter at 40' mounting height.
28. Approximately 100' detection diameter at 40' mounting height.
29. Replace X with number of Light Squares operating in low output mode.
30. LumaWatt Pro wireless sensors are factory installed only requiring network components LWP-EM-1, LWP-GW-1 and LWP-PoE8 in appropriate quantities. See www.eaton.com/lighting for LumaWatt Pro application information.
31. Not available with house side shield (HSS).
32. Only for use with SL2, SL3, SL4 and AFL distributions. The Light Square trim plate is painted black when the HSS option is selected.
33. CE is not available with the LWR, MS, MS/X, MS/DIM, P, R or PER7 options. Available in 120-277V only.
34. One required for each Light Square.
35. Requires 7-pin NEMA twistlock photocontrol receptacle.

EATON
Powering Business Worldwide

Eaton
1121 Highway 74 South
Peachtree City, GA 30269
P: 770-486-4800
www.eaton.com/lighting

Specifications and dimensions subject to change without notice.

Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE KORTE STADIUM - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES (COLLINSVILLE)	**Catalog Number:** GLEON-AF-03-LED-480-T4W-BZ-MS/DIM-L40W Notes:	**Type:** B LAI19-169706

Submitted by LIGHTING ASSOCIATES

LIGHTING ASSOCIATES

Job Name:
(new) SIUE KORTE STADIUM - LIGHT FIXTURES
Architect: BRiC PARTNERSHIP (BELLEVILLE)
Engineer: OATES AND ASSOCIATES (COLLINSVILLE)

Catalog Number:
DS210-850A350-D2-FP-DB-FBC-AB

Notes:

Type:
B

LAI19-169706

Poles - Steel

RTS / DS210

Light Duty

ROUND TAPERED STEEL DS210
Light Duty

valmont STRUCTURES

Job Name: _____ Client Name: _____

Job Location - City: _____ State: _____ Created By: _____ Date: _____

Product: _____ Quote: _____ Customer Approval: _____ Date: _____

DESIGNATION, LOAD AND DIMENSIONAL DATA

DESIGN INFORMATION							POLE DIMENSIONS				DESIGNATION
	80 MPH w/1.3 GUST		90 MPH w/1.3 GUST		100 MPH w/1.3 GUST						
NOMINAL MOUNTING HEIGHT	MAX EPA[1] (SQ.FT)	MAX WEIGHT[1] (LBS)	MAX EPA[1] (SQ.FT)	MAX WEIGHT[1] (LBS)	MAX EPA[1] (SQ.FT)	MAX WEIGHT[1] (LBS)	BASE OD (IN)	TOP OD (IN)	WALL THK (GA)	STRUCTURE WEIGHT[2] (LBS)	
20'-0"	19.3	482	15.1	377	12.2	305	5.90	3.10	11	140	590A200
	24.2	605	19.3	482	15.6	390	6.50	3.70	11	160	650A200
25'-0"	12.5	312	9.9	247	8.0	200	5.90	2.40	11	155	590A250
	20.3	507	16.2	405	13.1	327	7.00	3.50	11	200	700A250
	30.5	760	24.0	625	19.8	495	7.00	3.50	7	280	700E250
30'-0"	11.7	292	9.3	232	7.5	187	6.60	2.40	11	200	660A300
	18.9	473	14.9	373	12.0	300	8.00	3.80	11	265	800A300
	33.5	838	27.0	675	22.0	550	8.00	3.80	7	380	800E300
35'-0"	11.2	280	8.9	222	7.1	177	7.30	2.40	11	250	730A350
	18.9	472	15.1	377	12.2	305	8.50	3.60	11	315	850A350
	23.2	580	18.2	455	14.5	363	9.50	4.60	11	370	950A350
39'-0"	10.7	267	8.5	212	6.6	165	7.82	2.40	11	285	782A389
	17.2	430	13.5	338	10.8	270	9.00	3.58	11	355	900A389
	28.5	715	23.0	575	19.0	475	9.00	3.58	7	515	900E389
45'-0"	17.4	435	13.5	338	10.6	265	10.00	3.70	11	450	T00A450
	28.5	715	23.0	575	19.0	475	10.00	3.70	7	650	T00E450
50'-0"	13.2	330	10.6	265	8.3	208	10.00	3.00	11	475	T00A500
	20.5	512	16.5	412	13.6	340	10.00	3.00	7	680	T00E500

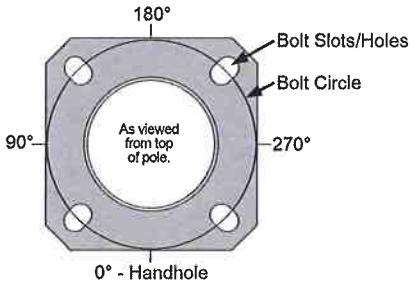
DS210 Heavy Duty poles available at valmontstructures.com

1. Maximum EPA (Effective Projected Area) and weight values are based on top mounted luminaires and/or brackets having a centroid 2'-6" above the Nominal Mounting Height. Variations from sizes above are available upon inquiry at the factory. Satisfactory performance of poles is dependent upon the pole being properly attached to a supporting foundation of adequate design.
2. Structure weight is a nominal value which includes the pole shaft and base plate only.

ANCHORAGE DATA

POLE		BASE PLATE				ANCHOR BOLTS		
		BOLT CIRCLE						
BASE OD (IN)	WALL THK (GA)	DIA (IN)	± (IN)	SQUARE (IN)	THK (IN)	DIA x LENGTH x HOOK (IN)	PROJECTION (IN)	± (IN)
5.90	11	9.00	0.50	10.00	0.875	1.00 x 36.00 x 4.00	4.13	0.25
6.50	11	9.50	0.50	10.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
6.60	11	9.50	0.50	10.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.00	11	10.00	0.50	10.88	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.00	7	10.00	0.50	10.88	1.000	1.00 x 36.00 x 4.00	4.25	0.25
7.30	11	10.50	0.50	11.25	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.82	11	11.00	0.50	11.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
8.00	11	11.00	0.50	11.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
8.00	7	11.00	0.50	11.50	1.250	1.25 x 42.00 x 6.00	5.00	0.25
8.50	11	11.50	0.50	12.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
9.00	11	12.50	0.50	12.38	1.000	1.00 x 36.00 x 4.00	4.25	0.25
9.00	7	12.50	0.50	12.38	1.250	1.25 x 42.00 x 6.00	5.00	0.25
9.50	11	13.00	0.50	13.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
10.00	11	13.50	0.50	14.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
10.00	7	13.50	0.50	14.00	1.250	1.25 x 42.00 x 6.00	5.00	0.25

Anchor Base Detail



PRODUCT ORDERING CODE

MODEL	DESIGNATION	FIXTURE MOUNTING	FINISH SYSTEM	STANDARD COLOR OPTIONS	BASE COVER	ANCHOR BOLTS	SUPPLEMENTAL INFO
DS210	850A350						
	Select Correct Designation from the *Load and Dimensional Data Chart.*	**Drill Mounting (See Orientation)** D1 = (1) Drilling @ 270° D2 = (2) Drillings @ 90° & 270° D3 = (3) Drillings @ 60°, 180°, & 300° D4 = (4) Drillings @ 0°, 90°, 180°, & 270° D5 = (2) Drillings @ 180° & 270° D6 = (3) Drillings @ 90°, 180°, & 270° **Tenon Mounting** P2 = 2.38" OD x 4" tenon P4 = 4.00" OD x 6" tenon P5 = 2.88" OD x 4" tenon P6 = 2.88" OD x 5" tenon P7 = 2.38" OD x 5" tenon P9 = Special Size (Specify) **Other Options** PC = Pole Cap PL = Plain Top (No Cap)	GV = Galvanized FP = Finish Painted -----OPTIONAL----- FPGV = Finish Paint over Galvanizing VP30 = V-PRO™ 30 System VP32 = V-PRO™ 32 System VP53 = V-PRO™ 53 System VP54 = V-PRO™ 54 System VP57 = V-PRO™ 57 System VP100 = V-PRO™ 100 System VP105 = V-PRO™ 105 System	GV = Galvanized BK = Black DB = Dark Bronze MB = Medium Bronze WH = White LG = Light Gray CB = Bronze DG = Dark Green ST = Sandstone HG = Hunter Green SG = Slate Gray SL = Silver SC = Special Color (Specify)	FBC = Full Base Cover -----OPTIONAL----- NC = Nut Covers 2T = Square Dart Cover DT = Dart Round Cover	AB = With Anchor Bolts LAB = Without Anchor Bolts	

Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE KORTE STADIUM - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES (COLLINSVILLE)	**Catalog Number:** DS210-850A350-D2-FP-DB-FBC-AB Notes:	**Type:** **B** LAI19-169706

Submitted by LIGHTING ASSOCIATES

Job Name:
(new) SIUE KORTE STADIUM - LIGHT FIXTURES
Architect: BRiC PARTNERSHIP (BELLEVILLE)
Engineer: OATES AND ASSOCIATES (COLLINSVILLE)

Catalog Number:
FSIR-100-PK

Notes:

Type:
TOOL

LAI19-169706

WATTSTOPPER

FIXTURE SENSORS & CONTROLS | ACCESSORIES

legrand®

WIRELESS HANDHELD CONFIGURATION TOOL

FSIR-100

Description

The FSIR-100 Wireless IR Configuration Tool is a handheld tool for remote configuration of IR-enabled fixture integrated sensors. The tool enables device modifications via pushbutton, without ladders or tools, and stores up to six sensor parameter profiles to speed configuration of multiple sensors.

Operation

Powered by three AAA batteries, the FSIR-100 features an easy-to-read organic LED (OLED) screen and bi-directional communication with IR-enabled fixture sensors. Its intuitive navigation pad provides a familiar interface for users who can see the current control parameters and make changes by navigating through simple menus. Adjustable sensor parameters include high and low modes, sensitivity, time delay, cut off and more. The FSIR-100 is also used to initiate automatic calibration of the ambient light level setpoint. The setpoint is used to hold the controlled lighting off or at low level when there is sufficient daylight.

IR Communication

The FSIR-100 uses bidirectional IR communication to send and receive sensor settings at mounting heights up to 40 feet. The device can display previously established sensor parameters, copy parameters and send new parameters or stored parameter profiles. For projects where identical settings may be desired across a large number of areas or spaces, this capability provides a streamlined method of configuration. Settings can be copied throughout a site, or in different sites.

Applications

Installers and end users can use the FSIR-100 for initial setup and subsequent sensor adjustement to ensure conformity with design intent. It simplifies changes to sensor settings by making the adjustment process ladder-free. It is compatible with IR-enabled Wattstopper HBP and FSP sensors. These products are ideal for use in parking facilites, gas station, pedestrian pathways and warehouse.

Features

- Establishes high and low mode light levels for 0-10V control
- Sets time delay, cut off time and sensitivity for motion detection
- Enables light level settings for either hold off control or daylighting control
- Initiates automatic setpoint configuration
- Allows ramp up and fade down rate adjustments
- Locks sensor settings to prevent unauthorized changes
- This product meets the materials restrictions of RoHS

PROJECT		LOCATION/ TYPE	

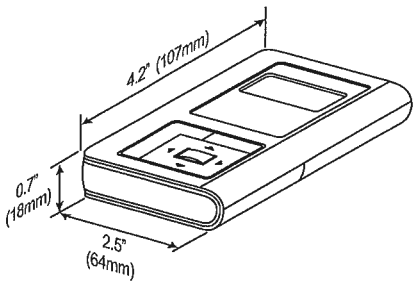
WWW.LEGRAND.US/WATTSTOPPER

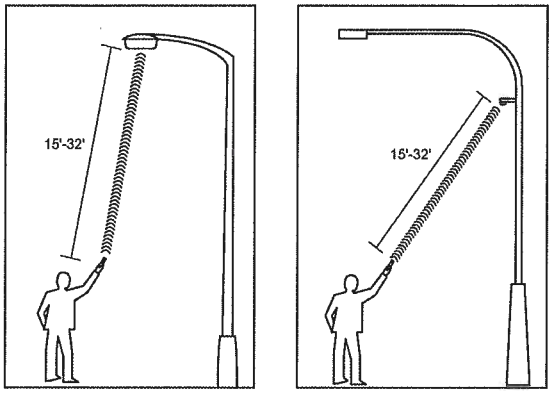
legrand

Specifications

- Three AAA 1.5 volt batteries (included)
- OLED display 1.4"W x .75"H (36mm x 19mm)
- Infrared (IR) transceiver (36kHz frequency)
- IR range: up to 32' (10m)
- Includes carrying case with belt clip
- Operating temperature: 0-104°F (0-40°C)
- FCC part 15 compliant
- TUV EMC compliant
- Five year warranty

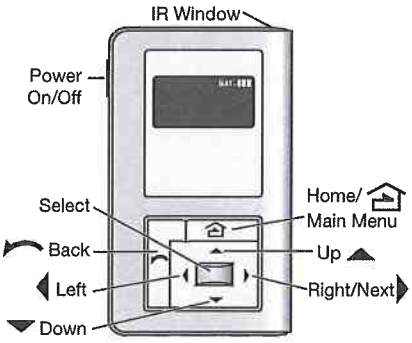
Dimensions & IR Coverage

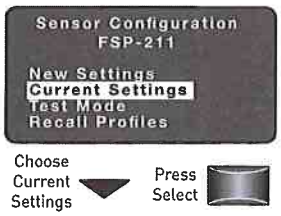




* Distance may vary depending on the lighting environment

Controls & Menus

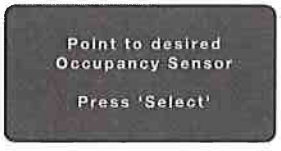




Choose Current Settings

Press Select

Press Select to View More Settings



Point and Press Select

Typical FSIR-100 screens. Complete menu and navigation information is available in the FSIR-100 User Guide.

Ordering Information

Catalog #	Description
☐ FSIR-100	Wireless Handheld Configuration Tool

LIGHTING ASSOCIATES
3216 S. BRENTWOOD BLVD.
WEBSTER GROVES MO 63119
Phone: (314) 531-3500
Fax: (314) 531-3737

Date: Apr 18, 2019

Job Name
(new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES
LAI19-169707
EDWARDSVILLE IL

Bid Date
Apr 9, 2019

Submittal Date
Apr 16, 2019

Architect:
BRiC PARTNERSHIP
100 EAST WASHINGTON
BELLEVILLE IL 62220

Engineer:
OATES AND ASSOCIATES
100 LANTER COURT, SUITE 1
COLLINSVILLE IL

Date: Apr 18, 2019

Transmittal

LIGHTING ASSOCIATES
3216 S. BRENTWOOD BLVD.
WEBSTER GROVES MO 63119
Phone: (314) 531-3500
From: Tyler Woldridge

Project **(new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES**
Quote# LAI19-169707
Location EDWARDSVILLE IL
Contact:

ATTACHED WE ARE SENDING YOU 1 COPY OF THE FOLLOWING ITEM:

☐ Drawings ☐ Specifications Other:
☐ Prints ☐ Information
☐ Plans ☐ Submittals

THESE ARE TRANSMITTED FOR:

☐ Prior Approval ☐ Resubmittal for Approval ☐ Record
☐ Approval ☐ Corrections Bids due on:
☐ Approval as Submitted ☐ Your Use Other:
☐ Approval as Noted ☐ Review and Comment

Qty	Type	MFG	Part
~~8~~ 9	A	MCGRAW	GLEON-AF-03-LED-480-T4W-BZ-MS/ DIM-L40W
WHB ~~8~~ 9	A	VALMONT INDUSTRIES, INC.	DS210-850A350-D2-FP-DB-FBC-AB
46	B	MCGRAW	GLEON-AF-03-LED-480-T4W-BZ-MS/ DIM-L40W
23	B	VALMONT INDUSTRIES, INC.	DS210-850A350-D2-FP-DB-FBC-AB
1	C	MCGRAW	GLEON-AF-03-LED-E1-T4W-BZ-MS/ DIM-L40W
1	C	VALMONT INDUSTRIES, INC.	DS210-850A350-D2-FP-DB-FBC-AB
2	D	MCGRAW	GLEON-AF-03-LED-E1-T4W-BZ-MS/ DIM-L40W
1	D	VALMONT INDUSTRIES, INC.	DS210-850A350-D2-FP-DB-FBC-AB
1	TOOL	MCGRAW REMOTE CONFIGURATION TOOL PACKED	FSIR-100-PK

Submitted by LIGHTING ASSOCIATES

Job Name:
(new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES
Architect: BRiC PARTNERSHIP (BELLEVILLE)
Engineer: OATES AND ASSOCIATES

Catalog Number:
GLEON-AF-03-LED-480-T4W-BZ-MS/DIM-L40W
Notes:

Type:
A
LAI19-169707

McGraw-Edison

DESCRIPTION

The Galleon™ LED luminaire delivers exceptional performance in a highly scalable, low-profile design. Patented, high-efficiency AccuLED Optics™ system provides uniform and energy conscious illumination to walkways, parking lots, roadways, building areas and security lighting applications. IP66 rated and UL/cUL Listed for wet locations.

Catalog #		Type
Project		
Comments		Date
Prepared by		

SPECIFICATION FEATURES

Construction
Extruded aluminum driver enclosure thermally isolated from Light Squares for optimal thermal performance. Heavy-wall, die-cast aluminum end caps enclose housing and die-cast aluminum heat sinks. A unique, patent pending interlocking housing and heat sink provides scalability with superior structural rigidity. 3G vibration tested and rated. Optional tool-less hardware available for ease of entry into electrical chamber. Housing is IP66 rated.

Optics
Patented, high-efficiency injection-molded AccuLED Optics technology. Optics are precisely designed to shape the distribution maximizing efficiency and application spacing. AccuLED Optics create consistent distributions with the scalability to meet customized application requirements. Offered standard in 4000K (+/- 275K) CCT 70 CRI. Optional 3000K, 5000K and 6000K CCT.

Electrical
LED drivers are mounted to removable tray assembly for ease of maintenance. 120-277V 50/60Hz, 347V 60Hz or 480V 60Hz operation. 480V is compatible for use with 480V Wye systems only. Standard with 0-10V dimming. Shipped standard with Eaton proprietary circuit module designed to withstand 10kV of transient line surge. The Galleon LED luminaire is suitable for operation in -40°C to 40°C ambient environments. For applications with ambient temperatures exceeding 40°C, specify the HA (High Ambient) option. Light Squares are IP66 rated. Greater than 90% lumen maintenance expected at 60,000 hours. Available in standard 1A drive current and optional 600mA, 800mA and 1200mA drive currents (nominal).

Mounting
STANDARD ARM MOUNT: Extruded aluminum arm includes internal bolt guides allowing for easy positioning of fixture during mounting. When mounting two or more luminaires at 90° and 120° apart, the EA extended arm may be required. Refer to the arm mounting requirement table. Round pole adapter included. For wall mounting, specify wall mount bracket option. QUICK MOUNT ARM: Adapter is bolted directly to the pole. Quick mount arm slide into place on the adapter and is secured via two screws, facilitating quick and easy installation. The versatile, patent pending, quick mount arm accommodates multiple drill patterns ranging from 1-1/2" to 4-7/8". Removal of the door on the quick mount arm enables wiring of the fixture without having to access the driver compartment. A knock-out enables round pole mounting.

Finish
Housing finished in super durable TGIC polyester powder coat paint, 2.5 mil nominal thickness for superior protection against fade and wear. Heat sink is powder coated black. Standard housing colors include black, bronze, grey, white, dark platinum and graphite metallic. RAL and custom color matches available.

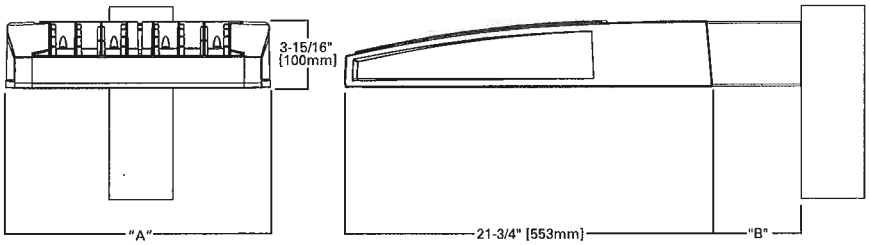
Warranty
Five-year warranty.

GLEON
GALLEON LED

1-10 Light Squares
Solid State LED

AREA/SITE LUMINAIRE

DIMENSIONS



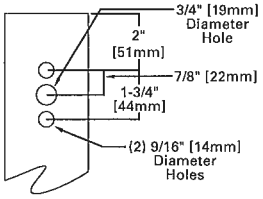
DIMENSION DATA

Number of Light Squares	"A" Width	"B" Standard Arm Length	"B" Optional Arm Length [1]	Weight with Arm (lbs.)	EPA with Arm [2] (Sq. Ft.)
1-4	15-1/2" (394mm)	7" (178mm)	10" (254mm)	33 (15.0 kgs.)	0.96
5-6	21-5/8" (549mm)	7" (178mm)	10" (254mm)	44 (20.0 kgs.)	1.00
7-8	27-5/8" (702mm)	7" (178mm)	13" (330mm)	54 (24.5 kgs.)	1.07
9-10	33-3/4" (857mm)	7" (178mm)	16" (406mm)	63 (28.6 kgs.)	1.12

NOTES: 1. Optional arm length to be used when mounting two fixtures at 90° on a single pole. 2. EPA calculated with optional arm length.

DRILLING PATTERN

TYPE "N"



CERTIFICATION DATA

UL/cUL Wet Location Listed
ISO 9001
LM79 / LM80 Compliant
3G Vibration Rated
IP66 Rated
DesignLights Consortium® Qualified*

ENERGY DATA

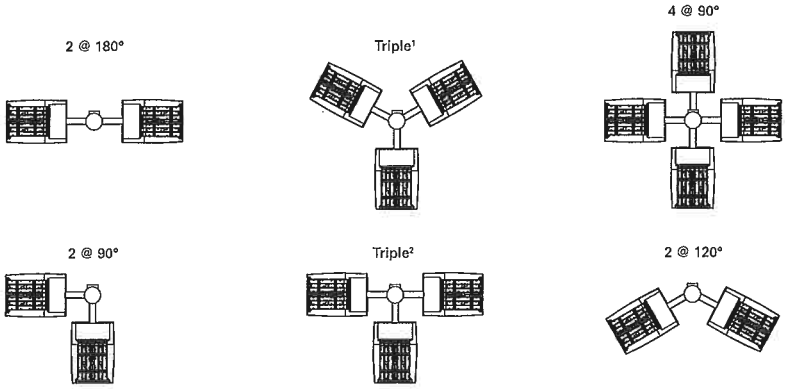
Electronic LED Driver
>0.9 Power Factor
<20% Total Harmonic Distortion
120V-277V 50/60Hz
347V & 480V 60Hz
-40°C Min. Temperature
40°C Max. Temperature
50°C Max. Temperature (HA Option)

*www.designlights.org

TD500020EN
June 21, 2018 4:04 PM

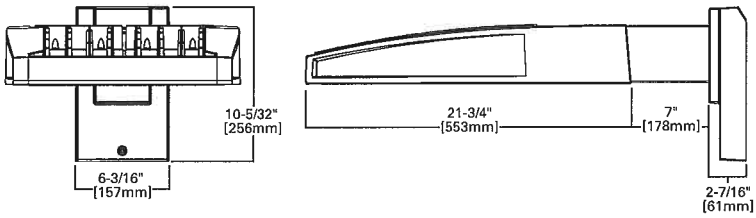
ARM MOUNTING REQUIREMENTS

Configuration	90° Apart	120° Apart
GLEON-AF-01	7" Arm (Standard)	7" Arm (Standard)
GLEON-AF-02	7" Arm (Standard)	7" Arm (Standard)
GLEON-AF-03	7" Arm (Standard)	7" Arm (Standard)
GLEON-AF-04	7" Arm (Standard)	7" Arm (Standard)
GLEON-AF-05	10" Extended Arm (Required)	7" Arm (Standard)
GLEON-AF-06	10" Extended Arm (Required)	7" Arm (Standard)
GLEON-AF-07	13" Extended Arm (Required)	13" Extended Arm (Required)
GLEON-AF-08	13" Extended Arm (Required)	13" Extended Arm (Required)
GLEON-AF-09	16" Extended Arm (Required)	16" Extended Arm (Required)
GLEON-AF-10	16" Extended Arm (Required)	16" Extended Arm (Required)

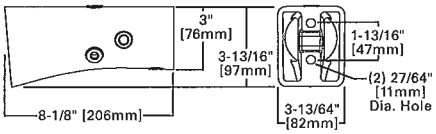


NOTES: 1 Round poles are 3 @ 120°. Square poles are 3 @ 90°. **2** Round poles are 3 @ 90°.

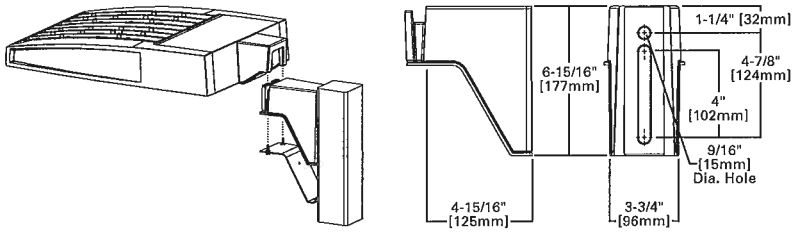
STANDARD WALL MOUNT



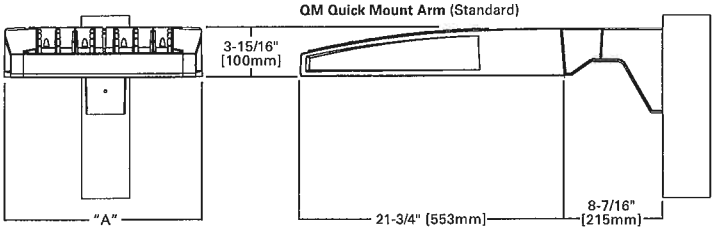
MAST ARM MOUNT



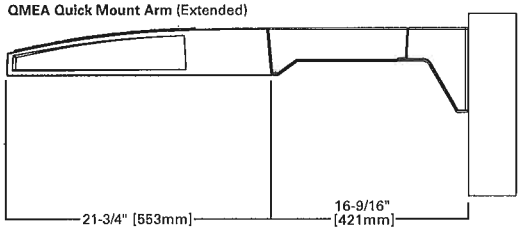
QUICK MOUNT ARM (INCLUDES FIXTURE ADAPTER)



QM Quick Mount Arm (Standard)



QMEA Quick Mount Arm (Extended)

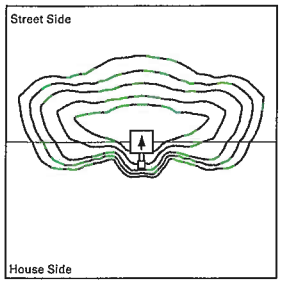


QUICK MOUNT ARM DATA

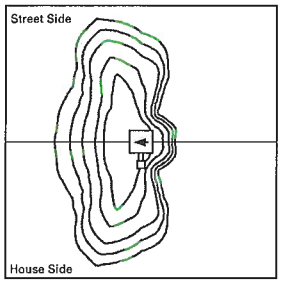
Number of Light Squares [1,2]	"A" Width	Weight with QM Arm (lbs.)	Weight with QMEA Arm (lbs.)	EPA (Sq. Ft.)
1-4	15-1/2" (394mm)	35 (15.91 kgs.)	38 (17.27 kgs.)	1.11
5-6 [3]	21-5/8" (549mm)	46 (20.91 kgs.)	49 (22.27 kgs.)	
7-8	27-5/8" (702mm)	56 (25.45 kgs.)	59 (26.82 kgs.)	

NOTES: 1 QM option available with 1-8 light square configurations. **2** QMEA option available with 1-6 light square configurations. **3** QMEA arm to be used when mounting two fixtures at 90° on a single pole.

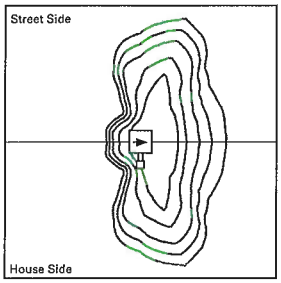
OPTIC ORIENTATION



Standard



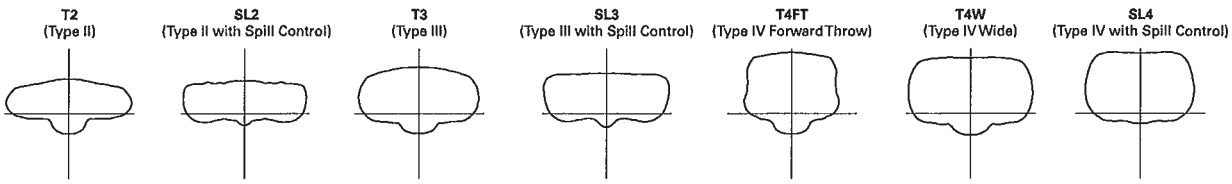
Optics Rotated Left @ 90° [L90]



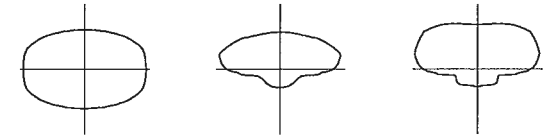
Optics Rotated Right @ 90° [R90]

OPTICAL DISTRIBUTIONS

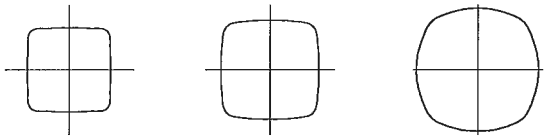
Asymmetric Area Distributions



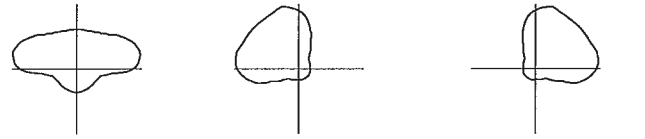
Asymmetric Roadway Distributions



Symmetric Distributions

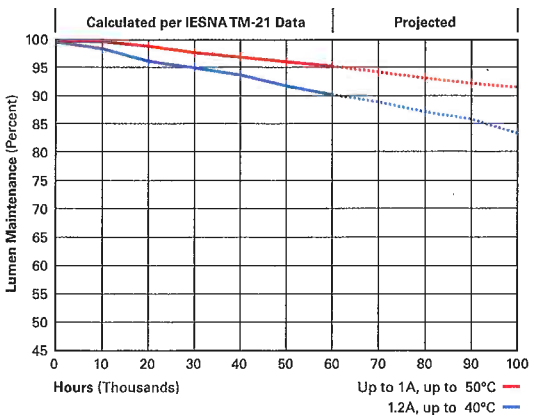


Specialized Distributions



LUMEN MAINTENANCE

Drive Current	Ambient Temperature	TM-21 Lumen Maintenance (60,000 Hours)	Projected L70 (Hours)
Up to 1A	Up to 50°C	> 95%	416,000
1.2A	Up to 40°C	> 90%	205,000



LUMEN MULTIPLIER

Ambient Temperature	Lumen Multiplier
0°C	1.02
10°C	1.01
25°C	1.00
40°C	0.99
50°C	0.97

NOMINAL POWER LUMENS (1.2A)

Number of Light Squares		1	2	3	4	5	6	7	8	9	10
Nominal Power (Watts)		67	129	191	258	320	382	448	511	575	640
Input Current @ 120V (A)		0.58	1.16	1.78	2.31	2.94	3.56	4.09	4.71	5.34	5.87
Input Current @ 208V (A)		0.33	0.63	0.93	1.27	1.57	1.87	2.22	2.52	2.8	3.14
Input Current @ 240V (A)		0.29	0.55	0.80	1.10	1.35	1.61	1.93	2.18	2.41	2.71
Input Current @ 277V (A)		0.25	0.48	0.70	0.96	1.18	1.39	1.69	1.90	2.09	2.36
Input Current @ 347V (A)		0.20	0.39	0.57	0.78	0.96	1.15	1.36	1.54	1.72	1.92
Input Current @ 480V (A)		0.15	0.30	0.43	0.60	0.73	0.85	1.03	1.16	1.28	1.45
Optics											
T2	4000K/5000K Lumens	6,709	13,111	19,562	25,848	32,026	38,325	45,324	51,355	57,286	63,424
	3000K Lumens	5,939	11,606	17,316	22,881	28,349	33,925	40,121	45,459	50,710	56,143
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
T2R	4000K/5000K Lumens	7,122	13,919	20,769	27,442	34,000	40,687	48,117	54,519	60,816	67,333
	3000K Lumens	5,939	11,606	17,316	22,881	28,349	33,925	40,121	45,459	50,710	56,143
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
T3	4000K/5000K Lumens	6,838	13,363	19,939	26,346	32,642	39,062	46,196	52,343	58,388	64,646
	3000K Lumens	6,053	11,829	17,650	23,321	28,895	34,578	40,893	46,334	51,685	57,225
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
T3R	4000K/5000K Lumens	6,990	13,660	20,382	26,931	33,368	39,930	47,223	53,506	59,686	66,081
	3000K Lumens	6,188	12,092	18,042	23,839	29,537	35,346	41,802	47,364	52,834	58,495
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
T4FT	4000K/5000K Lumens	6,878	13,440	20,055	26,499	32,832	39,289	46,464	52,646	58,726	65,020
	3000K Lumens	6,088	11,897	17,753	23,457	29,063	34,779	41,130	46,602	51,984	57,556
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
T4W	4000K/5000K Lumens	6,789	13,267	19,795	26,156	32,408	38,781	45,864	51,967	57,968	64,180
	3000K Lumens	6,010	11,744	17,523	23,153	28,688	34,329	40,599	46,001	51,313	56,812
	BUG Rating	B1-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
SL2	4000K/5000K Lumens	6,697	13,088	19,529	25,804	31,970	38,259	45,245	51,267	57,186	63,315
	3000K Lumens	5,928	11,585	17,287	22,842	28,300	33,867	40,051	45,382	50,621	56,046
	BUG Rating	B1-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
SL3	4000K/5000K Lumens	6,837	13,361	19,936	26,342	32,639	39,057	46,189	52,336	58,380	64,636
	3000K Lumens	6,052	11,827	17,647	23,318	28,892	34,573	40,887	46,328	51,678	57,216
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
SL4	4000K/5000K Lumens	6,496	12,695	18,943	25,029	31,011	37,110	43,886	49,727	55,470	61,414
	3000K Lumens	5,750	11,238	16,768	22,156	27,451	32,850	38,848	44,018	49,102	54,364
	BUG Rating	B1-U0-G2	B1-U0-G3	B2-U0-G4	B2-U0-G4	B2-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
5NQ	4000K/5000K Lumens	7,052	13,781	20,564	27,171	33,664	40,285	47,641	53,981	60,215	66,669
	3000K Lumens	6,242	12,199	18,203	24,052	29,799	35,660	42,172	47,784	53,302	59,015
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4
5MQ	4000K/5000K Lumens	7,182	14,034	20,942	27,671	34,284	41,027	48,518	54,975	61,323	67,896
	3000K Lumens	6,358	12,423	18,538	24,494	30,348	36,317	42,948	48,664	54,283	60,102
	BUG Rating	B3-U0-G1	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5	B5-U0-G5
5WQ	4000K/5000K Lumens	7,201	14,073	20,998	27,744	34,375	41,136	48,648	55,121	61,487	68,077
	3000K Lumens	6,374	12,457	18,587	24,559	30,429	36,414	43,063	48,793	54,428	60,262
	BUG Rating	B3-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5	B5-U0-G5	B5-U0-G5
SLL/SLR	4000K/5000K Lumens	6,009	11,741	17,519	23,148	28,681	34,321	40,589	45,990	51,301	56,798
	3000K Lumens	5,319	10,393	15,508	20,491	25,388	30,381	35,929	40,710	45,412	50,278
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5
RW	4000K/5000K Lumens	6,989	13,657	20,378	26,925	33,360	39,921	47,211	53,494	59,672	66,066
	3000K Lumens	6,187	12,089	18,039	23,834	29,530	35,338	41,791	47,353	52,822	58,482
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G4
AFL	4000K/5000K Lumens	7,014	13,706	20,452	27,023	33,481	40,066	47,383	53,688	59,888	66,306
	3000K Lumens	6,209	12,133	18,104	23,921	29,637	35,466	41,943	47,525	53,013	58,694
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G4	B4-U0-G4	B4-U0-G4

* Nominal data for 70 CRI.

NOMINAL POWER LUMENS (1A)

Number of Light Squares		1	2	3	4	5	6	7	8	9	10
Nominal Power (Watts)		59	113	166	225	279	333	391	445	501	558
Input Current @ 120V (A)		0.51	1.02	1.53	2.03	2.55	3.06	3.56	4.08	4.6	5.07
Input Current @ 208V (A)		0.29	0.56	0.82	1.11	1.37	1.64	1.93	2.19	2.46	2.75
Input Current @ 240V (A)		0.26	0.48	0.71	0.96	1.19	1.41	1.67	1.89	2.12	2.39
Input Current @ 277V (A)		0.23	0.42	0.61	0.83	1.03	1.23	1.45	1.65	1.84	2.09
Input Current @ 347V (A)		0.17	0.32	0.50	0.64	0.82	1.00	1.14	1.32	1.50	1.68
Input Current @ 480V (A)		0.14	0.24	0.37	0.48	0.61	0.75	0.91	0.99	1.12	1.28
Optics											
T2	4000K/5000K Lumens	6,116	11,951	17,833	23,563	29,195	34,937	41,317	46,814	52,221	57,817
	3000K Lumens	5,414	10,579	15,786	20,858	25,843	30,926	36,574	41,440	46,226	51,180
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
T2R	4000K/5000K Lumens	6,493	12,688	18,932	25,015	30,994	37,090	43,863	49,699	55,439	61,380
	3000K Lumens	5,748	11,231	16,759	22,143	27,436	32,832	38,828	43,994	49,075	54,334
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5
T3	4000K/5000K Lumens	6,234	12,181	18,176	24,017	29,756	35,609	42,111	47,715	53,225	58,930
	3000K Lumens	5,518	10,783	16,089	21,260	26,340	31,521	37,277	42,237	47,115	52,165
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
T3R	4000K/5000K Lumens	6,372	12,453	18,580	24,550	30,418	36,400	43,048	48,776	54,409	60,239
	3000K Lumens	5,640	11,023	16,447	21,732	26,926	32,221	38,106	43,177	48,163	53,324
	BUG Rating	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5
T4FT	4000K/5000K Lumens	6,270	12,252	18,282	24,156	29,929	35,815	42,356	47,992	53,534	59,271
	3000K Lumens	5,550	10,845	16,183	21,383	26,493	31,703	37,494	42,483	47,388	52,467
	BUG Rating	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
T4W	4000K/5000K Lumens	6,189	12,094	18,045	23,844	29,543	35,352	41,809	47,372	52,843	58,506
	3000K Lumens	5,479	10,706	15,973	21,107	26,151	31,294	37,009	41,934	46,777	51,790
	BUG Rating	B1-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
SL2	4000K/5000K Lumens	6,105	11,931	17,803	23,522	29,144	34,877	41,245	46,734	52,130	57,717
	3000K Lumens	5,404	10,561	15,759	20,822	25,798	30,873	36,510	41,369	46,145	51,091
	BUG Rating	B1-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
SL3	4000K/5000K Lumens	6,233	12,180	18,174	24,013	29,753	35,604	42,106	47,708	53,218	58,921
	3000K Lumens	5,517	10,782	16,088	21,256	26,337	31,517	37,272	42,231	47,109	52,157
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
SL4	4000K/5000K Lumens	5,922	11,572	17,268	22,816	28,269	33,829	40,006	45,330	50,566	55,984
	3000K Lumens	5,242	10,244	15,286	20,197	25,024	29,945	35,413	40,126	44,761	49,557
	BUG Rating	B1-U0-G2	B1-U0-G3	B2-U0-G3	B2-U0-G4	B2-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
5NQ	4000K/5000K Lumens	6,429	12,563	18,746	24,768	30,688	36,723	43,429	49,208	54,891	60,775
	3000K Lumens	5,691	11,121	16,594	21,925	27,165	32,507	38,443	43,559	48,590	53,798
	BUG Rating	B2-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4
5MQ	4000K/5000K Lumens	6,547	12,794	19,090	25,224	31,253	37,400	44,228	50,114	55,902	61,893
	3000K Lumens	5,795	11,325	16,898	22,328	27,665	33,106	39,151	44,361	49,484	54,788
	BUG Rating	B3-U0-G1	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5
5WQ	4000K/5000K Lumens	6,564	12,828	19,141	25,291	31,336	37,499	44,347	50,248	56,051	62,058
	3000K Lumens	5,810	11,355	16,944	22,388	27,739	33,194	39,256	44,480	49,616	54,934
	BUG Rating	B3-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5	B5-U0-G5	B5-U0-G5
SLL/SLR	4000K/5000K Lumens	5,478	10,703	15,970	21,102	26,145	31,286	37,001	41,924	46,765	51,777
	3000K Lumens	4,849	9,474	14,137	18,679	23,144	27,694	32,753	37,111	41,396	45,833
	BUG Rating	B1-U0-G2	B1-U0-G3	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
RW	4000K/5000K Lumens	6,371	12,449	18,576	24,544	30,411	36,392	43,037	48,764	54,396	60,225
	3000K Lumens	5,640	11,020	16,443	21,726	26,920	32,214	38,096	43,166	48,151	53,311
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4
AFL	4000K/5000K Lumens	6,394	12,494	18,644	24,634	30,521	36,524	43,194	48,942	54,593	60,444
	3000K Lumens	5,660	11,060	16,504	21,806	27,017	32,331	38,235	43,323	48,326	53,505
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3	B4-U0-G4	B4-U0-G4

* Nominal data for 70 CRI.

NOMINAL POWER LUMENS (800MA)

Number of Light Squares		1	2	3	4	5	6	7	8	9	10
Nominal Power (Watts)		44	85	124	171	210	249	295	334	374	419
Input Current @ 120V (A)		0.39	0.77	1.13	1.54	1.90	2.26	2.67	3.03	3.39	3.80
Input Current @ 208V (A)		0.22	0.44	0.62	0.88	1.06	1.24	1.50	1.68	1.87	2.12
Input Current @ 240V (A)		0.19	0.38	0.54	0.76	0.92	1.08	1.30	1.46	1.62	1.84
Input Current @ 277V (A)		0.17	0.36	0.47	0.72	0.83	0.95	1.19	1.31	1.42	1.67
Input Current @ 347V (A)		0.15	0.24	0.38	0.49	0.63	0.77	0.87	1.01	1.15	1.52
Input Current @ 480V (A)		0.11	0.18	0.29	0.37	0.48	0.59	0.66	0.77	0.88	0.96
Optics											
T2	4000K/5000K Lumens	4,941	9,656	14,408	19,038	23,588	28,227	33,382	37,823	42,191	46,713
	3000K Lumens	4,374	8,547	12,754	16,852	20,880	24,987	29,550	33,481	37,347	41,350
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B4-U0-G5	B4-U0-G5
T2R	4000K/5000K Lumens	5,246	10,251	15,296	20,211	25,041	29,966	35,439	40,154	44,791	49,592
	3000K Lumens	4,644	9,074	13,540	17,891	22,166	26,526	31,371	35,544	39,649	43,899
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5
T3	4000K/5000K Lumens	5,037	9,842	14,685	19,404	24,041	28,770	34,024	38,551	43,003	47,612
	3000K Lumens	4,459	8,712	12,999	17,176	21,281	25,467	30,118	34,125	38,066	42,146
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5
T3R	4000K/5000K Lumens	5,148	10,061	15,011	19,835	24,576	29,409	34,780	39,408	43,959	48,669
	3000K Lumens	4,557	8,906	13,288	17,558	21,755	26,033	30,787	34,884	38,913	43,082
	BUG Rating	B1-U0-G2	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
T4FT	4000K/5000K Lumens	5,066	9,899	14,770	19,516	24,181	28,936	34,221	38,774	43,252	47,888
	3000K Lumens	4,484	8,763	13,074	17,276	21,405	25,614	30,292	34,323	38,287	42,390
	BUG Rating	B1-U0-G2	B1-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
T4W	4000K/5000K Lumens	5,000	9,771	14,579	19,264	23,869	28,562	33,779	38,274	42,694	47,269
	3000K Lumens	4,426	8,649	12,905	17,052	21,129	25,283	29,901	33,880	37,793	41,843
	BUG Rating	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
SL2	4000K/5000K Lumens	4,933	9,639	14,383	19,005	23,547	28,178	33,324	37,758	42,118	46,632
	3000K Lumens	4,367	8,532	12,732	16,823	20,844	24,943	29,498	33,423	37,283	41,279
	BUG Rating	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5
SL3	4000K/5000K Lumens	5,036	9,841	14,683	19,401	24,039	28,766	34,019	38,546	42,997	47,605
	3000K Lumens	4,458	8,711	12,997	17,174	21,279	25,464	30,114	34,121	38,061	42,140
	BUG Rating	B1-U0-G2	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
SL4	4000K/5000K Lumens	4,784	9,350	13,951	18,434	22,840	27,332	32,323	36,624	40,854	45,232
	3000K Lumens	4,235	8,277	12,349	16,318	20,218	24,194	28,612	32,420	36,164	40,039
	BUG Rating	B1-U0-G2	B1-U0-G3	B1-U0-G3	B2-U0-G4	B2-U0-G4	B2-U0-G5	B2-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
5NQ	4000K/5000K Lumens	5,194	10,150	15,145	20,011	24,794	29,670	35,088	39,757	44,349	49,102
	3000K Lumens	4,598	8,985	13,406	17,714	21,948	26,264	31,060	35,193	39,258	43,465
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G3
5MQ	4000K/5000K Lumens	5,290	10,337	15,424	20,380	25,250	30,217	35,734	40,489	45,165	50,006
	3000K Lumens	4,683	9,150	13,653	18,040	22,351	26,748	31,632	35,841	39,980	44,265
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G4
5WQ	4000K/5000K Lumens	5,304	10,365	15,465	20,434	25,318	30,297	35,830	40,597	45,286	50,139
	3000K Lumens	4,695	9,175	13,690	18,088	22,411	26,819	31,717	35,936	40,087	44,383
	BUG Rating	B3-U0-G1	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5
SLL/SLR	4000K/5000K Lumens	4,426	8,648	12,903	17,049	21,124	25,278	29,894	33,872	37,784	41,832
	3000K Lumens	3,918	7,655	11,422	15,092	18,699	22,376	26,462	29,983	33,446	37,030
	BUG Rating	B1-U0-G2	B1-U0-G2	B2-U0-G3	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
RW	4000K/5000K Lumens	5,147	10,058	15,009	19,830	24,570	29,402	34,771	39,399	43,949	48,658
	3000K Lumens	4,556	8,903	13,286	17,554	21,749	26,027	30,779	34,876	38,904	43,072
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G4
AFL	4000K/5000K Lumens	5,166	10,095	15,063	19,903	24,659	29,509	34,898	39,542	44,108	48,835
	3000K Lumens	4,573	8,936	13,334	17,618	21,828	26,121	30,892	35,003	39,044	43,229
	BUG Rating	B1-U0-G1	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3

* Nominal data for 70 CRI.

NOMINAL POWER LUMENS (600MA)

Number of Light Squares		1	2	3	4	5	6	7	8	9	10
Nominal Power (Watts)		34	66	96	129	162	193	226	257	290	323
Input Current @ 120V (A)		0.30	0.58	0.86	1.16	1.44	1.73	2.03	2.33	2.59	2.89
Input Current @ 208V (A)		0.17	0.34	0.49	0.65	0.84	0.99	1.14	1.30	1.48	1.63
Input Current @ 240V (A)		0.15	0.30	0.43	0.56	0.74	0.87	1.00	1.13	1.30	1.43
Input Current @ 277V (A)		0.14	0.28	0.41	0.52	0.69	0.81	0.93	1.04	1.22	1.33
Input Current @ 347V (A)		0.11	0.19	0.30	0.39	0.49	0.60	0.69	0.77	0.90	0.99
Input Current @ 480V (A)		0.08	0.15	0.24	0.30	0.38	0.48	0.53	0.59	0.71	0.77
Optics											
T2	4000K/5000K Lumens	4,029	7,874	11,749	15,525	19,235	23,019	27,222	30,844	34,406	38,093
	3000K Lumens	3,566	6,970	10,400	13,743	17,027	20,376	24,097	27,303	30,456	33,720
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G4
T2R	4000K/5000K Lumens	4,278	8,360	12,474	16,482	20,421	24,437	28,900	32,745	36,527	40,441
	3000K Lumens	3,787	7,400	11,042	14,590	18,077	21,632	25,582	28,986	32,334	35,798
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4
T3	4000K/5000K Lumens	4,107	8,026	11,976	15,824	19,605	23,461	27,746	31,438	35,068	38,827
	3000K Lumens	3,636	7,105	10,601	14,007	17,354	20,768	24,561	27,829	31,042	34,370
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
T3R	4000K/5000K Lumens	4,198	8,205	12,242	16,175	20,041	23,982	28,363	32,137	35,848	39,689
	3000K Lumens	3,716	7,263	10,837	14,318	17,740	21,229	25,107	28,448	31,733	35,133
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
T4FT	4000K/5000K Lumens	4,131	8,072	12,045	15,915	19,719	23,597	27,907	31,620	35,272	39,052
	3000K Lumens	3,657	7,145	10,662	14,088	17,455	20,888	24,703	27,990	31,223	34,569
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5
T4W	4000K/5000K Lumens	4,077	7,968	11,889	15,710	19,465	23,292	27,546	31,212	34,816	38,547
	3000K Lumens	3,609	7,053	10,524	13,906	17,230	20,618	24,384	27,629	30,819	34,122
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5
SL2	4000K/5000K Lumens	4,022	7,861	11,729	15,498	19,202	22,979	27,175	30,791	34,347	38,028
	3000K Lumens	3,560	6,959	10,383	13,719	16,998	20,341	24,055	27,256	30,404	33,662
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
SL3	4000K/5000K Lumens	4,106	8,025	11,974	15,821	19,603	23,458	27,742	31,433	35,064	38,821
	3000K Lumens	3,635	7,104	10,599	14,005	17,353	20,765	24,557	27,824	31,039	34,364
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G3	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
SL4	4000K/5000K Lumens	3,902	7,624	11,377	15,033	18,626	22,289	26,359	29,867	33,316	36,886
	3000K Lumens	3,454	6,749	10,071	13,307	16,488	19,730	23,333	26,438	29,491	32,651
	BUG Rating	B1-U0-G2	B1-U0-G2	B1-U0-G3	B1-U0-G3	B2-U0-G4	B2-U0-G4	B2-U0-G4	B2-U0-G5	B3-U0-G5	B3-U0-G5
5NQ	4000K/5000K Lumens	4,236	8,277	12,351	16,319	20,219	24,196	28,614	32,422	36,166	40,042
	3000K Lumens	3,750	7,327	10,933	14,446	17,898	21,418	25,329	28,700	32,014	35,445
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G2	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G2	B5-U0-G3	B5-U0-G3
5MQ	4000K/5000K Lumens	4,314	8,429	12,578	16,619	20,591	24,641	29,141	33,019	36,832	40,779
	3000K Lumens	3,819	7,461	11,134	14,711	18,227	21,812	25,796	29,228	32,604	36,098
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4
5WQ	4000K/5000K Lumens	4,325	8,452	12,611	16,664	20,646	24,707	29,219	33,106	36,930	40,888
	3000K Lumens	3,828	7,482	11,163	14,751	18,276	21,871	25,865	29,305	32,690	36,194
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G4
SLL/SLR	4000K/5000K Lumens	3,609	7,052	10,522	13,903	17,226	20,613	24,378	27,622	30,812	34,114
	3000K Lumens	3,195	6,242	9,314	12,307	15,248	18,247	21,579	24,451	27,275	30,198
	BUG Rating	B1-U0-G1	B1-U0-G2	B1-U0-G3	B2-U0-G3	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
RW	4000K/5000K Lumens	4,197	8,202	12,239	16,171	20,036	23,977	28,356	32,129	35,839	39,680
	3000K Lumens	3,715	7,260	10,834	14,315	17,736	21,224	25,101	28,441	31,725	35,125
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3
AFL	4000K/5000K Lumens	4,213	8,232	12,284	16,230	20,109	24,064	28,459	32,246	35,969	39,824
	3000K Lumens	3,729	7,287	10,874	14,367	17,800	21,301	25,192	28,544	31,840	35,252
	BUG Rating	B1-U0-G1	B1-U0-G1	B2-U0-G2	B2-U0-G2	B2-U0-G2	B3-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3

* Nominal data for 70 CRI.

CONTROL OPTIONS

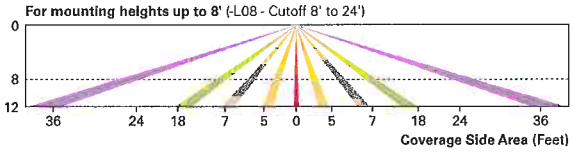
0-10V (DIM)
This fixture is offered standard with 0-10V dimming driver(s). The DIM option provides 0-10V dimming wire leads for use with a lighting control panel or other control method.

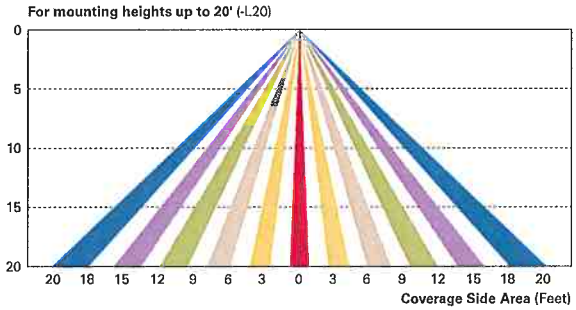
Photocontrol (P, R and PER7)
Optional button-type photocontrol (P) and photocontrol receptacles (R and PER7) provide a flexible solution to enable "dusk-to-dawn" lighting by sensing light levels. Advanced control systems compatible with NEMA 7-pin standards can be utilized with the PER7 receptacle.

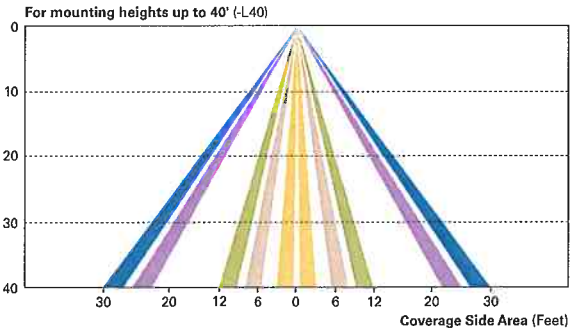
After Hours Dim (AHD)
This feature allows photocontrol-enabled luminaires to achieve additional energy savings by dimming during scheduled portions of the night. The dimming profile will automatically take effect after a "dusk-to-dawn" period has been calculated from the photocontrol input. Specify the desired dimming profile for a simple, factory-shipped dimming solution requiring no external control wiring. Reference the After Hours Dim supplemental guide for additional information.

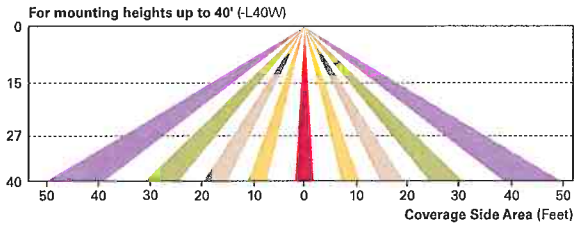
Dimming Occupancy Sensor (MS/DIM-LXX, MS/X-LXX and MS-LXX)
These sensors are factory installed in the luminaire housing. When the MS/DIM-LXX sensor option is selected, the occupancy sensor is connected to a dimming driver and the entire luminaire dims when there is no activity detected. When activity is detected, the luminaire returns to full light output. The MS/DIM sensor is factory preset to dim down to approximately 50 percent power with a time delay of five minutes. The MS-LXX sensor is factory preset to turn the luminaire off after five minutes of no activity. The MS/X-LXX is also preset for five minutes and only controls the specified number of light engines to maintain steady output from the remaining light engines.

These occupancy sensors includes an integral photocell that can be activated with the FSIR-100 accessory for "dusk-to-dawn" control or daylight harvesting - the factory preset is OFF. The FSIR-100 is a wireless tool utilized for changing the dimming level, time delay, sensitivity and other parameters. A variety of sensor lens are available to optimize the coverage pattern for mounting heights from 8'-40'.

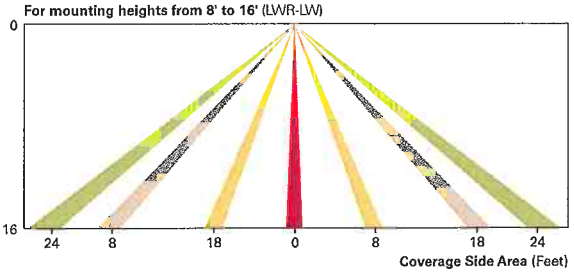


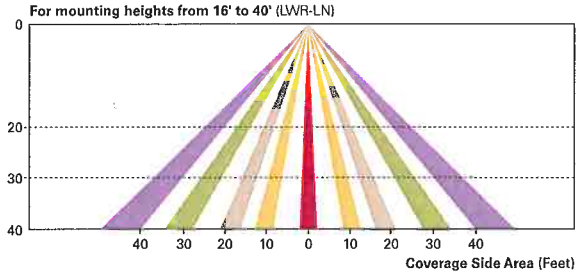






LumaWatt Pro Wireless Control and Monitoring System (LWR-LW and LWR-LN)
The Eaton's LumaWatt Pro powered by Enlighted is a connected lighting solution that combines a broad selection of energy-efficient LED luminaires with a powerful integrated wireless sensor system. The sensor controls the lighting system in compliance with the latest energy codes and collects valuable data about building performance and use. Software applications turn the granular data into information through energy dashboards and specialized apps that make it simple and help optimize the use of building resources, beyond lighting.





WaveLinx Wireless Outdoor Lighting Control Module (WOLC-7P-10A)
The 7-pin wireless outdoor lighting control module enables WaveLinx to control outdoor area, site and flood lighting. WaveLinx controls outdoor lighting using schedules to provide ON, OFF and dimming controls based on astronomic or time schedules based on a 7 day week.

ORDERING INFORMATION

Sample Number: GLEON-AF-04-LED-E1-T3-GM-QM

Product Family [1,2]	Light Engine	Number of Light Squares [3]	Lamp Type	Voltage	Distribution	Color	Mounting
GLEON=Galleon	AF=1A Drive Current	01=1 02=2 03=3 04=4 05=5 [4] 06=6 07=7 [5] 08=8 [6] 09=9 [6] 10=10 [6]	LED=Solid State Light Emitting Diodes	E1=120-277V 347=347V [7] 480=480V [7,8]	T2=Type II T2R=Type II Roadway T3=Type III T3R=Type III Roadway T4FT=Type IV Forward Throw T4W=Type IV Wide 5NQ=Type V Narrow 5MQ=Type V Square Medium 5WQ=Type V Square Wide SL2=Type II w/Spill Control SL3=Type III w/Spill Control SL4=Type IV w/Spill Control SLL=90° Spill Light Eliminator Left SLR=90° Spill Light Eliminator Right RW=Rectangular Wide Type I AFL=Automotive Frontline	AP=Grey BZ=Bronze BK=Black DP=Dark Platinum GM=Graphite Metallic WH=White	[Blank]=Arm for Round or Square Pole EA=Extended Arm [9] MA=Mast Arm Adapter [10] WM=Wall Mount QM=Quick Mount Arm (Standard Length) [11] QMEA=Quick Mount Arm (Extended Length) [12]

Options (Add as Suffix)	Accessories (Order Separately)
7030=70 CRI 3000K [13] 8030=80 CRI 3000K [14] 7050=70 CRI 5000K [13] 7080=70 CRI 6000K [13] 600=Drive Current Factory Set to Nominal 600mA [15] 800=Drive Current Factory Set to Nominal 800mA [15] 1200=Drive Current Factory Set to Nominal 1200mA [15,16] F=Single Fuse (120, 277 or 347V. Must Specify Voltage) FF=Double Fuse (208, 240 or 480V. Must Specify Voltage) 2L=Two Circuits [17,18] DIM=External 0-10V Dimming Leads [19,20] P=Button Type Photocontrol (120, 208, 240 or 277V. Must Specify Volatage) [21] PER7=NEMA 7-PIN Twistlock Photocontrol Receptacle [21] R=NEMA Twistlock Photocontrol Receptacle [21] AHD145=After Hours Dim, 5 Hours [22] AHD245=After Hours Dim, 6 Hours [22] AHD255=After Hours Dim, 7 Hours [22] AHD355=After Hours Dim, 8 Hours [22] HA=50°C High Ambient [23] MS/DIM-L08=Motion Sensor for Dimming Operation, Maximum 8' Mounting Height [24,25] MS/DIM-L20=Motion Sensor for Dimming Operation, 9' - 20' Mounting Height [24,26] MS/DIM-L40=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height [22,28] MS/DIM-L40W=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height (Wide Range) [24,28] MS/X-L08=Bi-Level Motion Sensor, Maximum 8' Mounting Height [24,26,29] MS/X-L20=Bi-Level Motion Sensor, 9' - 20' Mounting Height [24,26,29] MS/X-L40=Bi-Level Motion Sensor, 21' - 40' Mounting Height [22,27,29] MS/X-L40W=Bi-Level Motion Sensor, 21' - 40' Mounting Height (Wide Range) [24,28,29] MS-L08=Motion Sensor for ON/OFF Operation, Maximum 8' Mounting Height [24,25] MS-L20=Motion Sensor for ON/OFF Operation, 9' - 20' Mounting Height [24,26] MS-L40=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height [24,27] MS-L40W=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height (Wide Range) [24,28] LWR-LW=LumaWatt Pro Wireless Sensor, Wide Lens for 8' - 16' Mounting Height [30] LWR-LN=LumaWatt Pro Wireless Sensor, Narrow Lens for 16' - 40' Mounting Height [30] L90=Optics Rotated 90° Left R90=Optics Rotated 90° Right MT=Factory Installed Mesh Top TH=Tool-less Door Hardware LCF=Light Square Trim Plate Painted to Match Housing [31] HSS=Factory Installed House Side Shield [32] CE=CE Marking [33]	OA/RA1016=NEMA Photocontrol Multi-Tap - 105-285V OA/RA1027=NEMA Photocontrol - 480V OA/RA1201=NEMA Photocontrol - 347V OA/RA1013=Photocontrol Shorting Cap OA/RA1014=120V Photocontrol MA1252=10kV Surge Module Replacement MA1036-XX=Single Tenon Adapter for 2-3/8" O.D. Tenon MA1037-XX=2@180° Tenon Adapter for 2-3/8" O.D. Tenon MA1197-XX=3@120° Tenon Adapter for 2-3/8" O.D. Tenon MA1188-XX=4@90° Tenon Adapter for 2-3/8" O.D. Tenon MA1189-XX=2@90° Tenon Adapter for 2-3/8" O.D. Tenon MA1190-XX=3@90° Tenon Adapter for 2-3/8" O.D. Tenon MA1191-XX=2@120° Tenon Adapter for 2-3/8" O.D. Tenon MA1038-XX=Single Tenon Adapter for 3-1/2" O.D. Tenon MA1039-XX=2@180° Tenon Adapter for 3-1/2" O.D. Tenon MA1192-XX=3@120° Tenon Adapter for 3-1/2" O.D. Tenon MA1193-XX=4@90° Tenon Adapter for 3-1/2" O.D. Tenon MA1194-XX=2@90° Tenon Adapter for 3-1/2" O.D. Tenon MA1195-XX=3@90° Tenon Adapter for 3-1/2" O.D. Tenon FSIR-100=Wireless Configuration Tool for Occupancy Sensor [24] GLEON-MT1=Field Installed Mesh Top for 1-4 Light Squares GLEON-MT2=Field Installed Mesh Top for 5-6 Light Squares GLEON-MT3=Field Installed Mesh Top for 7-8 Light Squares GLEON-MT4=Field Installed Mesh Top for 9-10 Light Squares GLEON-QM=Quick Mount Arm Kit [10] GLEON-QMEA=Quick Mount Extended Arm Kit [11] LS/HSS=Field Installed House Side Shield [32,34] WOLC-7P-10A=WaveLinx Outdoor Control Module (7-pin) [35]

NOTES:
1. Customer is responsible for engineering analysis to confirm pole and fixture compatibility for all applications. Refer to our white paper WP513001EN for additional support information.
2. DesignLights Consortium® Qualified. Refer to www.designlights.org Qualified Products List under Family Models for details.
3. Standard 4000K CCT and minimum 70 CRI.
4. Not compatible with MS/4-LXX or MS/1-LXX sensors.
5. Not compatible with extended quick mount arm (QMEA).
6. Not compatible with standard quick mount arm (QM) or extended quick mount arm (QMEA).
7. Requires the use of an internal step down transformer when combined with sensor options. Not available with sensor at 1200mA. Not available in combination with the HA high ambient and sensor options at 1A.
8. Only for use with 480V Wye systems. Per NEC, not for use with ungrounded systems, impedance grounded systems or corner grounded systems (commonly known as Three Phase Three Wire Delta, Three Phase High Leg Delta and Three Phase Corner Grounded Delta systems).
9. May be required when two or more luminaires are oriented on a 90° or 120° drilling pattern. Refer to arm mounting requirement table.
10. Factory installed.
11. Maximum 8 light squares.
12. Maximum 6 light squares.
13. Extended lead times apply. Use dedicated IES files for 3000K, 5000K and 6000K when performing layouts. These files are published on the Galleon luminaire product page on the website.
14. Extended lead times apply. Use dedicated IES files for 3000K, 5000K and 6000K when performing layouts. These files are published on the Galleon luminaire product page on the website.
15. 1 Amp standard. Use dedicated IES files for 600mA, 800mA and 1200mA when performing layouts. These files are published on the Galleon luminaire product page on the website.
16. Not available with HA option.
17. 2L is not available with MS, MS/X or MS/DIM at 347V or 480V. 2L in AF-02 through AF-04 requires a larger housing, normally used for AF-05 or AF-06. Extended arm option may be required when mounting two or more fixtures per pole at 90° or 120°. Refer to arm mounting requirement table.
18. Not available with LumaWatt Pro wireless sensors.
19. Cannot be used with other control options.
20. Low voltage control lead brought out 18" outside fixture.
21. Not available if any "MS" sensor is selected. Motion sensor has an integral photocell.
22. Requires the use of P photocontrol or the PER7 or R photocontrol receptacle with photocontrol accessory. See After Hours Dim supplemental guide for additional information.
23. 50°C lumen maintenance data applies to 600mA, 800mA and 1A drive currents.
24. The FSIR-100 configuration tool is required to adjust parameters including high and low modes, sensitivity, time delay, cutoff and more. Consult your lighting representative at Eaton for more information.
25. Approximately 22' detection diameter at 8' mounting height.
26. Approximately 40' detection diameter at 20' mounting height.
27. Approximately 60' detection diameter at 40' mounting height.
28. Approximately 100' detection diameter at 40' mounting height.
29. Replace X with number of Light Squares operating in low output mode.
30. LumaWatt Pro wireless sensors are factory installed only requiring network components LWP-EM-1, LWP-GW-1 and LWP-PoE8 in appropriate quantities. See www.eaton.com/lighting for LumaWatt Pro application information.
31. Not available with house side shield (HSS).
32. Only for use with SL2, SL3, SL4 and AFL distributions. The Light Square trim plate is painted black when the HSS option is selected.
33. CE is not available with the LWR, MS, MS/X, MS/DIM, P, R or PER7 options. Available in 120-277V only.
34. One required for each Light Square.
35. Requires 7-pin NEMA twistlock photocontrol receptacle.

EATON
Powering Business Worldwide

Eaton
1121 Highway 74 South
Peachtree City, GA 30269
P: 770-486-4800
www.eaton.com/lighting

Specifications and dimensions subject to change without notice.

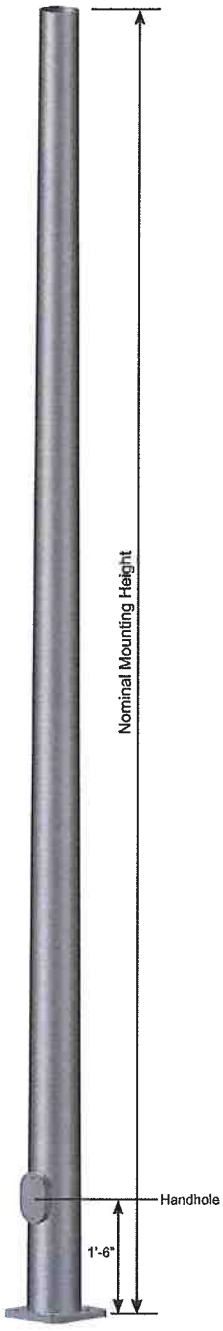
Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES	**Catalog Number:** GLEON-AF-03-LED-480-T4W-BZ-MS/DIM-L40W Notes:	**Type:** A LAI19-169707

Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES	**Catalog Number:** DS210-850A350-D2-FP-DB-FBC-AB Notes:	**Type:** A LAI19-169707

valmont STRUCTURES

ROUND TAPERED STEEL DS210
Light Duty

Job Name:	Client Name:
Job Location - City: State:	Created By: Date:
Product: Quote:	Customer Approval: Date:



Tenon Top

Pole Cap

Cross Section

Handhole

Full Base Cover (Standard Square)

Dart Square-2T (Optional)

Dart Round - DT (Optional)

SPECIFICATIONS

Pole Shaft - The pole shaft is a 1-piece assembly conforming to ASTM A595 Grade A or A572 Grade 55 with a constant linear taper of 0.14 in/ft.

Pole Top - Pole is provided with either a tenon top or drilled for a fixture mounting. A removable pole cap is provided for drilled poles. Consult the luminaire manufacturer for correct tenon size or drill pattern. Other pole top options include pole cap only (PC) or plain top (PL) which is typical when the pole top diameter matches the necessary slip fit dimensions.

Handhole - A reinforced handhole with grounding provision is provided at 1'-6" from the base end of the pole assembly. Each handhole includes a cover and the cover attachment hardware. Poles with a 5.90" base diameter are supplied with a 3" X 5" rectangular handhole. All other pole assemblies are provided with a 4" X 6.5" ovalized handhole. Handhole dimensions are nominal.

Base Cover - A two-piece full base cover fabricated from ABS plastic is provided with each pole assembly. Valmont reserves the right to provide a two-piece steel full base cover on some applications depending upon the finish requirement and/or pole base diameter. Nut covers can be substituted on most models. Additional base cover options, including the Dart Square (2T) cast aluminum cover and Dart Round (DT) cast aluminum cover, are available upon request.

Anchor Bolts - Anchor bolts conform to ASTM F1554 Grade 55 and are provided with two hex nuts and two flat washers. Bolts have an "L" bend on one end and are galvanized a minimum of 12" on the threaded end.

Hardware - All structural fasteners are galvanized high strength carbon steel. All non-structural fasteners are galvanized or zinc-plated carbon steel or stainless steel.

Finish - Standard finishes are either Galvanized (GV) or Finish Painted (FP). Additional finish options including Finish Paint over Galvanizing (FPGV) or any of the V-PRO™ Finish Coating Systems are available upon request. See the product ordering code for color options.

Design Criteria - Please reference Design Criteria Specification for appropriate design conditions.

ROUND TAPERED STEEL DS210
Light Duty

valmont STRUCTURES

Job Name: _____ Client Name: _____

Job Location - City: _____ State: _____ Created By: _____ Date: _____

Product: _____ Quote: _____ Customer Approval: _____ Date: _____

DESIGNATION, LOAD AND DIMENSIONAL DATA

DESIGN INFORMATION							POLE DIMENSIONS				DESIGNATION
	80 MPH w/1.3 GUST		90 MPH w/1.3 GUST		100 MPH w/1.3 GUST						
NOMINAL MOUNTING HEIGHT	MAX EPA[1] (SQ FT)	MAX WEIGHT[1] (LBS)	MAX EPA[1] (SQ FT)	MAX WEIGHT[1] (LBS)	MAX EPA[1] (SQ FT)	MAX WEIGHT[1] (LBS)	BASE OD (IN)	TOP OD (IN)	WALL THK (GA)	STRUCTURE WEIGHT[2] (LBS)	
20'-0"	19.3	482	15.1	377	12.2	305	5.90	3.10	11	140	590A200
	24.2	605	19.3	482	15.6	390	6.50	3.70	11	160	650A200
25'-0"	12.5	312	9.9	247	8.0	200	5.90	2.40	11	155	590A250
	20.3	507	16.2	405	13.1	327	7.00	3.50	11	200	700A250
	30.5	760	24.0	625	19.8	495	7.00	3.50	7	280	700E250
30'-0"	11.7	292	9.3	232	7.5	187	6.60	2.40	11	200	660A300
	18.9	473	14.9	373	12.0	300	8.00	3.80	11	265	800A300
	33.5	838	27.0	675	22.0	550	8.00	3.80	7	380	800E300
35'-0"	11.2	280	8.9	222	7.1	177	7.30	2.40	11	250	730A350
	18.9	472	15.1	377	12.2	305	8.50	3.60	11	315	850A350
	23.2	580	18.2	455	14.5	363	9.50	4.60	11	370	950A350
39'-0"	10.7	267	8.5	212	6.6	165	7.82	2.40	11	285	782A389
	17.2	430	13.5	338	10.8	270	9.00	3.58	11	355	900A389
	28.5	715	23.0	575	19.0	475	9.00	3.58	7	515	900E389
45'-0"	17.4	435	13.5	338	10.6	265	10.00	3.70	11	450	T00A450
	28.5	715	23.0	575	19.0	475	10.00	3.70	7	650	T00E450
50'-0"	13.2	330	10.6	265	8.3	208	10.00	3.00	11	475	T00A500
	20.5	512	16.5	412	13.6	340	10.00	3.00	7	680	T00E500

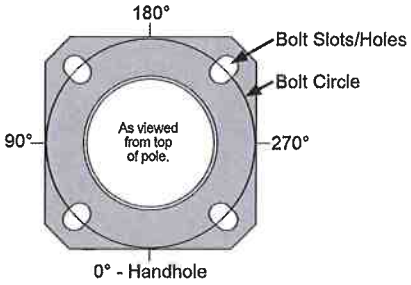
DS210 Heavy Duty poles available at valmontstructures.com

1. Maximum EPA (Effective Projected Area) and weight values are based on top mounted luminaires and/or brackets having a centroid 2'-6" above the Nominal Mounting Height. Variations from sizes above are available upon inquiry at the factory. Satisfactory performance of poles is dependent upon the pole being properly attached to a supporting foundation of adequate design.
2. Structure weight is a nominal value which includes the pole shaft and base plate only.

ANCHORAGE DATA

POLE		BASE PLATE				ANCHOR BOLTS		
		BOLT CIRCLE						
BASE OD (IN)	WALL THK (GA)	DIA (IN)	± (IN)	SQUARE (IN)	THK (IN)	DIA x LENGTH x HOOK (IN)	PROJECTION (IN)	± (IN)
5.90	11	9.00	0.50	10.00	0.875	1.00 x 36.00 x 4.00	4.13	0.25
6.50	11	9.50	0.50	10.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
6.60	11	9.50	0.50	10.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.00	11	10.00	0.50	10.88	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.00	7	10.00	0.50	10.88	1.000	1.00 x 36.00 x 4.00	4.25	0.25
7.30	11	10.50	0.50	11.25	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.82	11	11.00	0.50	11.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
8.00	11	11.00	0.50	11.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
8.00	7	11.00	0.50	11.50	1.250	1.25 x 42.00 x 6.00	5.00	0.25
8.50	11	11.50	0.50	12.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
9.00	11	12.50	0.50	12.38	1.000	1.00 x 36.00 x 4.00	4.25	0.25
9.00	7	12.50	0.50	12.38	1.250	1.25 x 42.00 x 6.00	5.00	0.25
9.50	11	13.00	0.50	13.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
10.00	11	13.50	0.50	14.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
10.00	7	13.50	0.50	14.00	1.250	1.25 x 42.00 x 6.00	5.00	0.25

Anchor Base Detail



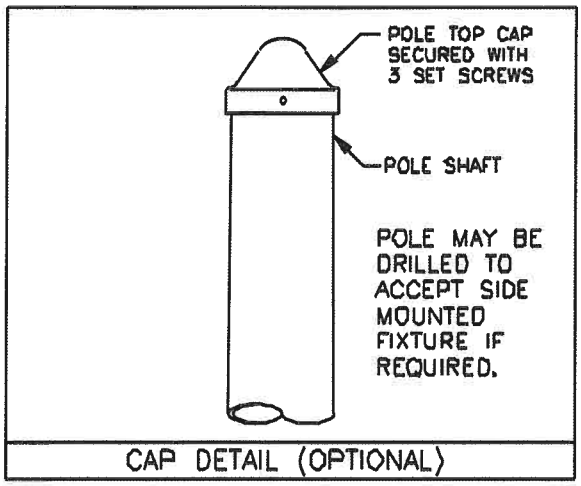
PRODUCT ORDERING CODE

MODEL	DESIGNATION	FIXTURE MOUNTING	FINISH SYSTEM	STANDARD COLOR OPTIONS	BASE COVER	ANCHOR BOLTS	SUPPLEMENTAL INFO
DS210	850A350						
	Select Correct Designation from the *Load and Dimensional Data Chart.*	**Drill Mounting (See Orientation)** D1 = (1) Drilling @ 270° D2 = (2) Drillings @ 90° & 270° D3 = (3) Drillings @ 60°, 180°, & 300° D4 = (4) Drillings @ 0°, 90°, 180°, & 270° D5 = (2) Drillings @ 180° & 270° D6 = (3) Drillings @ 90°, 180°, & 270° **Tenon Mounting** P2 = 2.38" OD x 4" tenon P4 = 4.00" OD x 6" tenon P5 = 2.88" OD x 4" tenon P6 = 2.88" OD x 5" tenon P7 = 2.38" OD x 5" tenon P9 = Special Size (Specify) **Other Options** PC = Pole Cap PL = Plain Top (No Cap)	GV = Galvanized FP = Finish Painted -----OPTIONAL----- FPGV = Finish Paint over Galvanizing VP30 = V-PRO™ 30 System VP32 = V-PRO™ 32 System VP53 = V-PRO™ 53 System VP54 = V-PRO™ 54 System VP57 = V-PRO™ 57 System VP100 = V-PRO™ 100 System VP105 = V-PRO™ 105 System	GV = Galvanized BK = Black DB = Dark Bronze MB = Medium Bronze WH = White LG = Light Gray CB = Bronze DG = Dark Green ST = Sandstone HG = Hunter Green SG = Slate Gray SL = Silver SC = Special Color (Specify)	FBC = Full Base Cover -----OPTIONAL----- NC = Nut Covers 2T = Square Dart Cover DT = Dart Round Cover	AB = With Anchor Bolts LAB = Without Anchor Bolts	

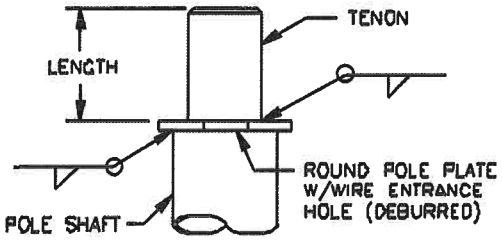
Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES	**Catalog Number:** DS210-850A350-D2-FP-DB-FBC-AB Notes:	**Type:** A LAI19-169707

DS210 Round Tapered

valmont STRUCTURES

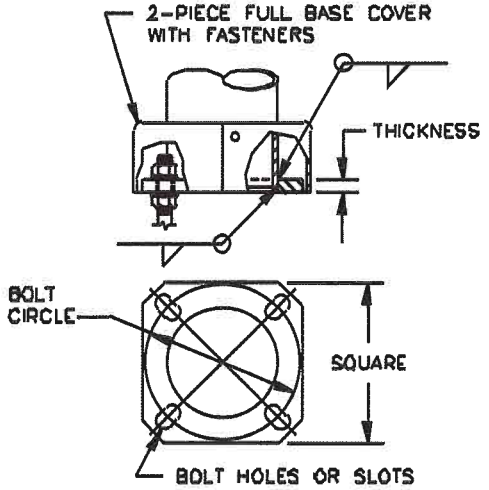


CAP DETAIL (OPTIONAL)

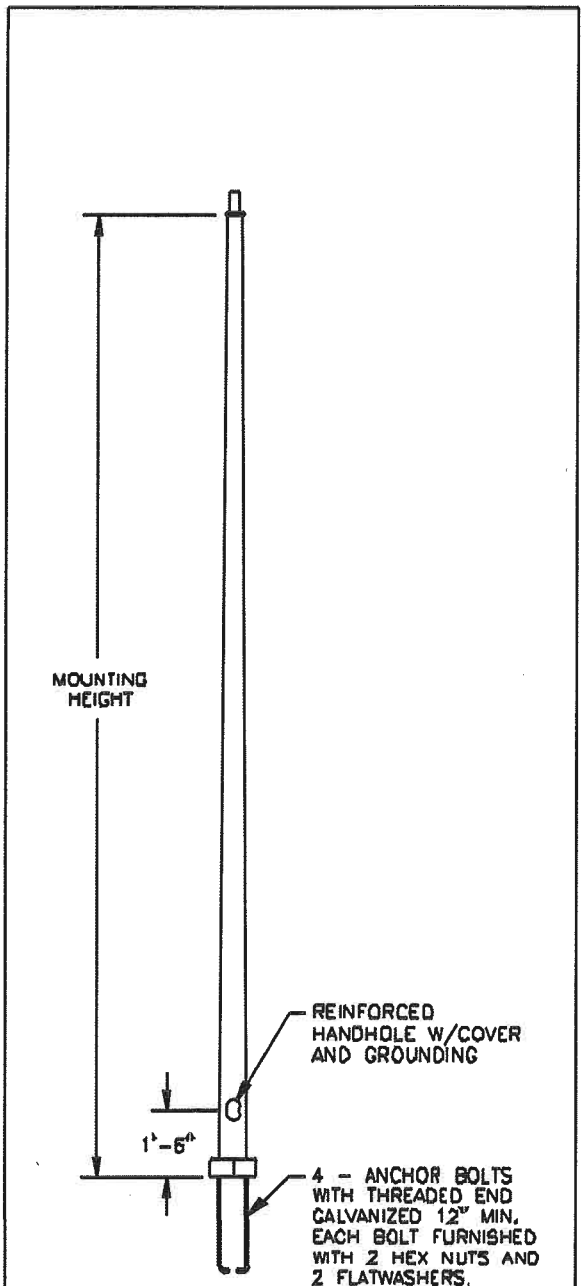


DESIGN NUMBER	O.D. (in)	PIPE SIZE	LENGTH (in)
P2	2.375	2.0" SCHED 80	4
P4	4.000	3.5" SCHED 40	6
PL	2.400	POLE TOP	N.A.

TENON DETAIL (STANDARD)



POLE BASE DETAIL



DS210 POLE DETAIL

SPC7204 02/17 valmontstructures.com carries the most current spec information and supersedes these guidelines.

Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES	**Catalog Number:** DS210-850A350-D2-FP-DB-FBC-AB Notes:	**Type:** A LAI19-169707

ORDERING INFORMATION

Sample Number: GLEON-AF-04-LED-E1-T3-GM-QM

Product Family [1,2]	Light Engine	Number of Light Squares [3]	Lamp Type	Voltage	Distribution	Color	Mounting
GLEON=Galleon	AF=1A Drive Current	01=1 02=2 03=3 04=4 05=5 [4] 06=6 07=7 [5] 08=8 [6] 09=9 [6] 10=10 [6]	LED=Solid State Light Emitting Diodes	E1=120-277V 347=347V [7] 480=480V [7,8]	T2=Type II T2R=Type II Roadway T3=Type III T3R=Type III Roadway T4FT=Type IV Forward Throw T4W=Type IV Wide 5NQ=Type V Narrow 5MQ=Type V Square Medium 5WQ=Type V Square Wide SL2=Type II w/Spill Control SL3=Type III w/Spill Control SL4=Type IV w/Spill Control SLL=90° Spill Light Eliminator Left SLR=90° Spill Light Eliminator Right RW=Rectangular Wide Type I AFL=Automotive Frontline	AP=Grey BZ=Bronze BK=Black DP=Dark Platinum GM=Graphite Metallic WH=White	[Blank]=Arm for Round or Square Pole EA=Extended Arm [9] MA=Mast Arm Adapter [10] WM=Wall Mount QM=Quick Mount Arm (Standard Length) [11] QMEA=Quick Mount Arm (Extended Length) [12]

Options (Add as Suffix)	Accessories (Order Separately)
7030=70 CRI 3000K [13] 8030=80 CRI 3000K [14] 7050=70 CRI 5000K [13] 7060=70 CRI 6000K [13] 600=Drive Current Factory Set to Nominal 600mA [15] 800=Drive Current Factory Set to Nominal 800mA [15] 1200=Drive Current Factory Set to Nominal 1200mA [15,16] F=Single Fuse (120, 277 or 347V. Must Specify Voltage) FF=Double Fuse (208, 240 or 480V. Must Specify Voltage) 2L=Two Circuits [17,18] DIM=External 0-10V Dimming Leads [19,20] P=Button Type Photocontrol (120, 208, 240 or 277V. Must Specify Volatage) [21] PER7=NEMA 7-PIN Twistlock Photocontrol Receptacle [21] R=NEMA Twistlock Photocontrol Receptacle [21] AHD145=After Hours Dim, 5 Hours [22] AHD245=After Hours Dim, 6 Hours [22] AHD255=After Hours Dim, 7 Hours [22] AHD355=After Hours Dim, 8 Hours [22] HA=50°C High Ambient [23] MS/DIM-L08=Motion Sensor for Dimming Operation, Maximum 8' Mounting Height [24,25] MS/DIM-L20=Motion Sensor for Dimming Operation, 9' - 20' Mounting Height [24,26] MS/DIM-L40=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height [22,26] MS/DIM-L40W=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height (Wide Range) [24,28] MS/X-L08=Bi-Level Motion Sensor, Maximum 8' Mounting Height [24,25,29] MS/X-L20=Bi-Level Motion Sensor, 9' - 20' Mounting Height [24,26,29] MS/X-L40=Bi-Level Motion Sensor, 21' - 40' Mounting Height [22,27,29] MS/X-L40W=Bi-Level Motion Sensor, 21' - 40' Mounting Height (Wide Range) [24,28,29] MS-L08=Motion Sensor for ON/OFF Operation, Maximum 8' Mounting Height [24,25] MS-L20=Motion Sensor for ON/OFF Operation, 9' - 20' Mounting Height [24,26] MS-L40=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height [24,27] MS-L40W=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height (Wide Range) [24,28] LWR-LW=LumaWatt Pro Wireless Sensor, Wide Lens for 8' - 16' Mounting Height [30] LWR-LN=LumaWatt Pro Wireless Sensor, Narrow Lens for 16' - 40' Mounting Height [30] L90=Optics Rotated 90° Left R90=Optics Rotated 90° Right MT=Factory Installed Mesh Top TH=Tool-less Door Hardware LCF=Light Square Trim Plate Painted to Match Housing [31] HSS=Factory Installed House Side Shield [32] CE=CE Marking [33]	OA/RA1016=NEMA Photocontrol Multi-Tap - 105-285V OA/RA1027=NEMA Photocontrol - 480V OA/RA1201=NEMA Photocontrol - 347V OA/RA1013=Photocontrol Shorting Cap OA/RA1014=120V Photocontrol MA1252=10kV Surge Module Replacement MA1036-XX=Single Tenon Adapter for 2-3/8" O.D. Tenon MA1037-XX=2@180° Tenon Adapter for 2-3/8" O.D. Tenon MA1197-XX=3@120° Tenon Adapter for 2-3/8" O.D. Tenon MA1188-XX=4@90° Tenon Adapter for 2-3/8" O.D. Tenon MA1189-XX=2@90° Tenon Adapter for 2-3/8" O.D. Tenon MA1190-XX=3@90° Tenon Adapter for 2-3/8" O.D. Tenon MA1191-XX=2@120° Tenon Adapter for 2-3/8" O.D. Tenon MA1038-XX=Single Tenon Adapter for 3-1/2" O.D. Tenon MA1039-XX=2@180° Tenon Adapter for 3-1/2" O.D. Tenon MA1192-XX=3@120° Tenon Adapter for 3-1/2" O.D. Tenon MA1193-XX=4@90° Tenon Adapter for 3-1/2" O.D. Tenon MA1194-XX=2@90° Tenon Adapter for 3-1/2" O.D. Tenon MA1195-XX=3@90° Tenon Adapter for 3-1/2" O.D. Tenon FSIR-100=Wireless Configuration Tool for Occupancy Sensor [24] GLEON-MT1=Field Installed Mesh Top for 1-4 Light Squares GLEON-MT2=Field Installed Mesh Top for 5-6 Light Squares GLEON-MT3=Field Installed Mesh Top for 7-8 Light Squares GLEON-MT4=Field Installed Mesh Top for 9-10 Light Squares GLEON-QM=Quick Mount Arm Kit [10] GLEON-QMEA=Quick Mount Extended Arm Kit [11] LS/HSS=Field Installed House Side Shield [32,34] WOLC-7P-10A=WaveLinx Outdoor Control Module (7-pin) [35]

NOTES:

1. Customer is responsible for engineering analysis to confirm pole and fixture compatibility for all applications. Refer to our white paper WP513001EN for additional support information.
2. DesignLights Consortium® Qualified. Refer to www.designlights.org Qualified Products List under Family Models for details.
3. Standard 4000K CCT and minimum 70 CRI.
4. Not compatible with MS/4-LXX or MS/1-LXX sensors.
5. Not compatible with extended quick mount arm (QMEA).
6. Not compatible with standard quick mount arm (QM) or extended quick mount arm (QMEA).
7. Requires the use of an internal step down transformer when combined with sensor options. Not available with sensor at 1200mA. Not available in combination with the HA high ambient and sensor options at 1A.
8. Only for use with 480V Wye systems. Per NEC, not for use with ungrounded systems, impedance grounded systems or corner grounded systems (commonly known as Three Phase Three Wire Delta, Three Phase High Leg Delta and Three Phase Corner Grounded Delta systems).
9. May be required when two or more luminaires are oriented on a 90° or 120° drilling pattern. Refer to arm mounting requirement table.
10. Factory installed.
11. Maximum 8 light squares.
12. Maximum 6 light squares.
13. Extended lead times apply. Use dedicated IES files for 3000K, 5000K and 6000K when performing layouts. These files are published on the Galleon luminaire product page on the website.
14. Extended lead times apply. Use dedicated IES files for 3000K, 5000K and 6000K when performing layouts. These files are published on the Galleon luminaire product page on the website.
15. 1 Amp standard. Use dedicated IES files for 600mA, 800mA and 1200mA when performing layouts. These files are published on the Galleon luminaire product page on the website.
16. Not available with HA option.
17. 2L is not available with MS, MS/X or MS/DIM at 347V or 480V. 2L in AF-02 through AF-04 requires a larger housing, normally used for AF-05 or AF-06. Extended arm option may be required when mounting two or more fixtures per pole at 90° or 120°. Refer to arm mounting requirement table.
18. Not available with LumaWatt Pro wireless sensors.
19. Cannot be used with other control options.
20. Low voltage control lead brought out 18" outside fixture.
21. Not available if any "MS" sensor is selected. Motion sensor has an integral photocell.
22. Requires the use of P photocontrol or the PER7 or R photocontrol receptacle with photocontrol accessory. See After Hours Dim supplemental guide for additional information.
23. 50°C lumen maintenance data applies to 600mA, 800mA and 1A drive currents.
24. The FSIR-100 configuration tool is required to adjust parameters including high and low modes, sensitivity, time delay, cutoff and more. Consult your lighting representative at Eaton for more information.
25. Approximately 25' detection diameter at 8' mounting height.
26. Approximately 40' detection diameter at 20' mounting height.
27. Approximately 60' detection diameter at 40' mounting height.
28. Approximately 100' detection diameter at 40' mounting height.
29. Replace "X" with number of Light Squares operating in low output mode.
30. LumaWatt Pro wireless sensors are factory installed only requiring network components LWP-EM-1, LWP-GW-1 and LWP-PoE8 in appropriate quantities. See www.eaton.com/lighting for LumaWatt Pro application information.
31. Not available with house side shield (HSS).
32. Only for use with SL2, SL3, SL4 and AFL distributions. The Light Square trim plate is painted black when the HSS option is selected.
33. CE is not available with the LWR, MS, MS/X, MS/DIM, P, R or PER7 options. Available in 120-277V only.
34. One required for each Light Square.
35. Requires 7-pin NEMA twistlock photocontrol receptacle.

EATON
Powering Business Worldwide

Eaton
1121 Highway 74 South
Peachtree City, GA 30269
P: 770-486-4800
www.eaton.com/lighting

Specifications and dimensions subject to change without notice.

Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES	**Catalog Number:** GLEON-AF-03-LED-480-T4W-BZ-MS/DIM-L40W Notes:	**Type:** B LAI19-169707

Submitted by LIGHTING ASSOCIATES

Job Name:
(new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES
Architect: BRIC PARTNERSHIP (BELLEVILLE)
Engineer: OATES AND ASSOCIATES

Catalog Number:
DS210-850A350-D2-FP-DB-FBC-AB

Notes:

Type:
B

LAI19-169707

Poles - Steel | RTS / DS210 | Light Duty

ROUND TAPERED STEEL DS210
Light Duty

valmont STRUCTURES

Job Name: _____ Client Name: _____
Job Location - City: _____ State: _____ Created By: _____ Date: _____
Product: _____ Quote: _____ Customer Approval: _____ Date: _____

DESIGNATION, LOAD AND DIMENSIONAL DATA

DESIGN INFORMATION							POLE DIMENSIONS				DESIGNATION
	80 MPH w/1.3 GUST		90 MPH w/1.3 GUST		100 MPH w/1.3 GUST						
NOMINAL MOUNTING HEIGHT	MAX EPA[1] (SQ.FT)	MAX WEIGHT[1] (LBS)	MAX EPA[1] (SQ.FT)	MAX WEIGHT[1] (LBS)	MAX EPA[1] (SQ.FT)	MAX WEIGHT[1] (LBS)	BASE OD (IN)	TOP OD (IN)	WALL THK (GA)	STRUCTURE WEIGHT[2] (LBS)	
20'-0"	19.3	482	15.1	377	12.2	305	5.90	3.10	11	140	590A200
	24.2	605	19.3	482	15.6	390	6.50	3.70	11	160	650A200
25'-0"	12.5	312	9.9	247	8.0	200	5.90	2.40	11	155	590A250
	20.3	507	16.2	405	13.1	327	7.00	3.50	11	200	700A250
	30.5	760	24.0	625	19.8	495	7.00	3.50	7	280	700E250
30'-0"	11.7	292	9.3	232	7.5	187	6.60	2.40	11	200	660A300
	18.9	473	14.9	373	12.0	300	8.00	3.80	11	265	800A300
	33.5	838	27.0	675	22.0	550	8.00	3.80	7	380	800E300
35'-0"	11.2	280	8.9	222	7.1	177	7.30	2.40	11	250	730A350
	18.9	472	15.1	377	12.2	305	8.50	3.60	11	315	850A350
	23.2	580	18.2	455	14.5	363	9.50	4.60	11	370	950A350
39'-0"	10.7	267	8.5	212	6.6	165	7.82	2.40	11	285	782A389
	17.2	430	13.5	338	10.8	270	9.00	3.58	11	355	900A389
	28.5	715	23.0	575	19.0	475	9.00	3.58	7	515	900E389
45'-0"	17.4	435	13.5	338	10.6	265	10.00	3.70	11	450	T00A450
	28.5	715	23.0	575	19.0	475	10.00	3.70	7	650	T00E450
50'-0"	13.2	330	10.6	265	8.3	208	10.00	3.00	11	475	T00A500
	20.5	512	16.5	412	13.6	340	10.00	3.00	7	680	T00E500

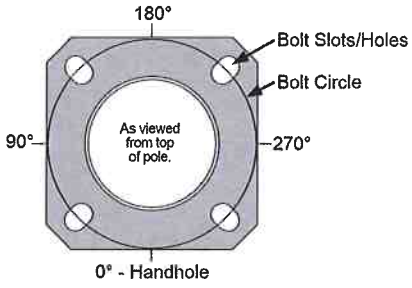
DS210 Heavy Duty poles available at valmontstructures.com

1. Maximum EPA (Effective Projected Area) and weight values are based on top mounted luminaires and/or brackets having a centroid 2'-6" above the Nominal Mounting Height. Variations from sizes above are available upon inquiry at the factory. Satisfactory performance of poles is dependent upon the pole being properly attached to a supporting foundation of adequate design.
2. Structure weight is a nominal value which includes the pole shaft and base plate only.

ANCHORAGE DATA

POLE		BASE PLATE				ANCHOR BOLTS		
		BOLT CIRCLE						
BASE OD (IN)	WALL THK (GA)	DIA (IN)	± (IN)	SQUARE (IN)	THK (IN)	DIA x LENGTH x HOOK (IN)	PROJECTION (IN)	± (IN)
5.90	11	9.00	0.50	10.00	0.875	1.00 x 36.00 x 4.00	4.13	0.25
6.50	11	9.50	0.50	10.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
6.60	11	9.50	0.50	10.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.00	11	10.00	0.50	10.88	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.00	7	10.00	0.50	10.88	1.000	1.00 x 36.00 x 4.00	4.25	0.25
7.30	11	10.50	0.50	11.25	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.82	11	11.00	0.50	11.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
8.00	11	11.00	0.50	11.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
8.00	7	11.00	0.50	11.50	1.250	1.25 x 42.00 x 6.00	5.00	0.25
8.50	11	11.50	0.50	12.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
9.00	11	12.50	0.50	12.38	1.000	1.00 x 36.00 x 4.00	4.25	0.25
9.00	7	12.50	0.50	12.38	1.250	1.25 x 42.00 x 6.00	5.00	0.25
9.50	11	13.00	0.50	13.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
10.00	11	13.50	0.50	14.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
10.00	7	13.50	0.50	14.00	1.250	1.25 x 42.00 x 6.00	5.00	0.25

Anchor Base Detail



PRODUCT ORDERING CODE

MODEL	DESIGNATION	FIXTURE MOUNTING	FINISH SYSTEM	STANDARD COLOR OPTIONS	BASE COVER	ANCHOR BOLTS	SUPPLEMENTAL INFO
DS210	850A350						
	Select Correct Designation from the *Load and Dimensional Data Chart.*	**Drill Mounting (See Orientation)** D1 = (1) Drilling @ 270° D2 = (2) Drillings @ 90° & 270° D3 = (3) Drillings @ 60°, 180°, & 300° D4 = (4) Drillings @ 0°, 90°, 180°, & 270° D5 = (2) Drillings @ 180° & 270° D6 = (3) Drillings @ 90°, 180°, & 270° **Tenon Mounting** P2 = 2.38" OD x 4" tenon P4 = 4.00" OD x 6" tenon P5 = 2.88" OD x 4" tenon P6 = 2.88" OD x 5" tenon P7 = 2.38" OD x 5" tenon P9 = Special Size (Specify) **Other Options** PC = Pole Cap PL = Plain Top (No Cap)	GV = Galvanized FP = Finish Painted -----OPTIONAL----- FPGV = Finish Paint over Galvanizing VP30 = V-PRO™ 30 System VP32 = V-PRO™ 32 System VP53 = V-PRO™ 53 System VP54 = V-PRO™ 54 System VP57 = V-PRO™ 57 System VP100 = V-PRO™ 100 System VP105 = V-PRO™ 105 System	GV = Galvanized BK = Black DB = Dark Bronze MB = Medium Bronze WH = White LG = Light Gray CB = Bronze DG = Dark Green ST = Sandstone HG = Hunter Green SG = Slate Gray SL = Silver SC = Special Color (Specify)	FBC = Full Base Cover -----OPTIONAL----- NC = Nut Covers 2T = Square Dart Cover DT = Dart Round Cover	AB = With Anchor Bolts LAB = Without Anchor Bolts	

Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES	**Catalog Number:** DS210-850A350-D2-FP-DB-FBC-AB Notes:	**Type:** B LAI19-169707

Submitted by LIGHTING ASSOCIATES

Job Name:
(new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES
Architect: BRIC PARTNERSHIP (BELLEVILLE)
Engineer: OATES AND ASSOCIATES

Catalog Number:
GLEON-AF-03-LED-E1-T4W-BZ-MS/DIM-L40W
Notes:

Type:
C
LAI19-169707

ORDERING INFORMATION

Sample Number: GLEON-AF-04-LED-E1-T3-GM-QM

Product Family [1,2]	Light Engine	Number of Light Squares [3]	Lamp Type	Voltage	Distribution	Color	Mounting
GLEON=Galleon	AF=1A Drive Current	01=1 02=2 03=3 04=4 05=5 [4] 06=6 07=7 [5] 08=8 [5] 09=9 [6] 10=10 [6]	LED=Solid State Light Emitting Diodes	E1=120-277V ~~347-347V~~ [7] 480=480V [7,8]	T2=Type II T2R=Type II Roadway T3=Type III T3R=Type III Roadway T4FT=Type IV Forward Throw T4W=Type IV Wide 5NQ=Type V Narrow 5MQ=Type V Square Medium 5WQ=Type V Square Wide SL2=Type II w/Spill Control SL3=Type III w/Spill Control SL4=Type IV w/Spill Control SLL=90° Spill Light Eliminator Left SLR=90° Spill Light Eliminator Right RW=Rectangular Wide Type I AFL=Automotive Frontline	AP=Grey BZ=Bronze BK=Black DP=Dark Platinum GM=Graphite Metallic WH=White	[Blank]=Arm for Round or Square Pole EA=Extended Arm [9] MA=Mast Arm Adapter [10] WM=Wall Mount QM=Quick Mount Arm (Standard Length) [11] QMEA=Quick Mount Arm (Extended Length) [12]

Options (Add as Suffix)

7030=70 CRI 3000K [13]
8030=80 CRI 3000K [14]
7050=70 CRI 5000K [13]
7060=70 CRI 6000K [13]
600=Drive Current Factory Set to Nominal 600mA [15]
800=Drive Current Factory Set to Nominal 800mA [15]
1200=Drive Current Factory Set to Nominal 1200mA [15,16]
F=Single Fuse (120, 277 or 347V. Must Specify Voltage)
FF=Double Fuse (208, 240 or 480V. Must Specify Voltage)
2L=Two Circuits [12,18]
DIM=External 0-10V Dimming Leads [19,20]
P=Button Type Photocontrol (120, 208, 240 or 277V. Must Specify Volatage) [21]
PER7=NEMA 7-PIN Twistlock Photocontrol Receptacle [21]
R=NEMA Twistlock Photocontrol Receptacle [21]
AHD145=After Hours Dim, 5 Hours [22]
AHD245=After Hours Dim, 6 Hours [22]
AHD255=After Hours Dim, 7 Hours [22]
AHD355=After Hours Dim, 8 Hours [22]
HA=50°C High Ambient [23]
MS/DIM-L08=Motion Sensor for Dimming Operation, Maximum 8' Mounting Height [24,25]
MS/DIM-L20=Motion Sensor for Dimming Operation, 9' - 20' Mounting Height [24,26]
MS/DIM-L40=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height [22,26]
MS/DIM-L40W=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height (Wide Range) [24,28]
MS/X-L08=Bi-Level Motion Sensor, Maximum 8' Mounting Height [24,25,29]
MS/X-L20=Bi-Level Motion Sensor, 9' - 20' Mounting Height [24,26,29]
MS/X-L40=Bi-Level Motion Sensor, 21' - 40' Mounting Height [22,27,29]
MS/X-L40W=Bi-Level Motion Sensor, 21' - 40' Mounting Height (Wide Range) [24,28,29]
MS-L08=Motion Sensor for ON/OFF Operation, Maximum 8' Mounting Height [24,25]
MS-L20=Motion Sensor for ON/OFF Operation, 9' - 20' Mounting Height [24,26]
MS-L40=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height [24,27]
MS-L40W=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height (Wide Range) [24,28]
LWR-LW=LumaWatt Pro Wireless Sensor, Wide Lens for 8' - 16' Mounting Height [30]
LWR-LN=LumaWatt Pro Wireless Sensor, Narrow Lens for 16' - 40' Mounting Height [30]
L90=Optics Rotated 90° Left
R90=Optics Rotated 90° Right
MT=Factory Installed Mesh Top
TH=Tool-less Door Hardware
LCF=Light Square Trim Plate Painted to Match Housing [31]
HSS=Factory Installed House Side Shield [32]
CE=CE Marking [33]

Accessories (Order Separately)

OA/RA1016=NEMA Photocontrol Multi-Tap - 105-285V
OA/RA1027=NEMA Photocontrol - 480V
OA/RA1201=NEMA Photocontrol - 347V
OA/RA1013=Photocontrol Shorting Cap
OA/RA1014=120V Photocontrol
MA1252=10kV Surge Module Replacement
MA1036-XX=Single Tenon Adapter for 2-3/8" O.D. Tenon
MA1037-XX=2@180° Tenon Adapter for 2-3/8" O.D. Tenon
MA1197-XX=3@120° Tenon Adapter for 2-3/8" O.D. Tenon
MA1188-XX=4@90° Tenon Adapter for 2-3/8" O.D. Tenon
MA1189-XX=2@90° Tenon Adapter for 2-3/8" O.D. Tenon
MA1190-XX=3@90° Tenon Adapter for 2-3/8" O.D. Tenon
MA1191-XX=2@120° Tenon Adapter for 2-3/8" O.D. Tenon
MA1038-XX=Single Tenon Adapter for 3-1/2" O.D. Tenon
MA1039-XX=2@180° Tenon Adapter for 3-1/2" O.D. Tenon
MA1192-XX=3@120° Tenon Adapter for 3-1/2" O.D. Tenon
MA1193-XX=4@90° Tenon Adapter for 3-1/2" O.D. Tenon
MA1194-XX=2@90° Tenon Adapter for 3-1/2" O.D. Tenon
MA1195-XX=3@90° Tenon Adapter for 3-1/2" O.D. Tenon
FSIR-100=Wireless Configuration Tool for Occupancy Sensor [24]
GLEON-MT1=Field Installed Mesh Top for 1-4 Light Squares
GLEON-MT2=Field Installed Mesh Top for 5-6 Light Squares
GLEON-MT3=Field Installed Mesh Top for 7-8 Light Squares
GLEON-MT4=Field Installed Mesh Top for 9-10 Light Squares
GLEON-QM=Quick Mount Arm Kit [10]
GLEON-QMEA=Quick Mount Extended Arm Kit [11]
LS/HSS=Field Installed House Side Shield [32,34]
WOLC-7P-10A=WaveLinx Outdoor Control Module (7-pin) [35]

NOTES:
1. Customer is responsible for engineering analysis to confirm pole and fixture compatibility for all applications. Refer to our white paper WP513001EN for additional support information.
2. DesignLights Consortium® Qualified. Refer to www.designlights.org Qualified Products List under Family Models for details.
3. Standard 4000K CCT and minimum 70 CRI.
4. Not compatible with MS/4-LXX or MS/1-LXX sensors.
5. Not compatible with extended quick mount arm (QMEA).
6. Not compatible with standard quick mount arm (QM) or extended quick mount arm (QMEA).
7. Requires the use of an internal step down transformer when combined with sensor options. Not available with sensor at 1200mA. Not available in combination with the HA high ambient and sensor options at 1A.
8. Only for use with 480V Wye systems. Per NEC, not for use with ungrounded systems, impedance grounded systems or corner grounded systems (commonly known as Three Phase Three Wire Delta, Three Phase High Leg Delta and Three Phase Corner Grounded Delta systems).
9. May be required when two or more luminaires are oriented on a 90° or 120° drilling pattern. Refer to arm mounting requirement table.
10. Factory installed.
11. Maximum 8 light squares.
12. Maximum 6 light squares.
13. Extended lead times apply. Use dedicated IES files for 3000K, 5000K and 6000K when performing layouts. These files are published on the Galleon luminaire product page on the website.
14. Extended lead times apply. Use dedicated IES files for 3000K, 5000K and 6000K when performing layouts. These files are published on the Galleon luminaire product page on the website.
15. 1 Amp standard. Use dedicated IES files for 600mA, 800mA and 1200mA when performing layouts. These files are published on the Galleon luminaire product page on the website.
16. Not available with HA option.
17. 2L is not available with MS, MS/X or MS/DIM at 347V or 480V. 2L in AF-02 through AF-04 requires a larger housing, normally used for AF-05 or AF-06. Extended arm option may be required when mounting two or more fixtures per pole at 90° or 120°. Refer to arm mounting requirement table.
18. Not available with LumaWatt Pro wireless sensors.
19. Cannot be used with other control options.
20. Low voltage control lead brought out 18" outside fixture.
21. Not available if any "MS" sensor is selected. Motion sensor has an integral photocell.
22. Requires the use of P photocontrol or the PER7 or R photocontrol receptacle with photocontrol accessory. See After Hours Dim supplemental guide for additional information.
23. 50°C lumen maintenance data applies to 600mA, 800mA and 1A drive currents.
24. The FSIR-100 configuration tool is required to adjust parameters including high and low modes, sensitivity, time delay, cutoff and more. Consult your lighting representative at Eaton for more information.
25. Approximately 22' detection diameter at 8' mounting height.
26. Approximately 40' detection diameter at 20' mounting height.
27. Approximately 60' detection diameter at 40' mounting height.
28. Approximately 100' detection diameter at 40' mounting height.
29. Replace X with number of light squares operating in low output mode.
30. LumaWatt Pro wireless sensors are factory installed only requiring network components LWP-EM-1, LWP-GW-1 and LWP-PoE8 in appropriate quantities. See www.eaton.com/lighting for LumaWatt Pro application information.
31. Not available with house side shield (HSS).
32. Only for use with SL2, SL3, SL4 and AFL distributions. The Light Square trim plate is painted black when the HSS option is selected.
33. CE is not available with the LWR, MS, MS/X, MS/DIM, P, R or PER7 options. Available in 120-277V only.
34. One required for each Light Square.
35. Requires 7-pin NEMA twistlock photocontrol receptacle.

EATON
Powering Business Worldwide

Eaton
1121 Highway 74 South
Peachtree City, GA 30269
P: 770-486-4800
www.eaton.com/lighting

Specifications and dimensions subject to change without notice.

Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES	**Catalog Number:** GLEON-AF-03-LED-E1-T4W-BZ-MS/DIM-L40W Notes:	**Type:** C LAI19-169707

Submitted by LIGHTING ASSOCIATES

LIGHTING ASSOCIATES

Job Name:
(new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES
Architect: BRiC PARTNERSHIP (BELLEVILLE)
Engineer: OATES AND ASSOCIATES

Catalog Number:
DS210-850A350-D2-FP-DB-FBC-AB

Notes:

Type:
C

LAI19-169707

Poles - Steel

RTS / DS210

Light Duty

ROUND TAPERED STEEL DS210
Light Duty

valmont STRUCTURES

Job Name: _____ Client Name: _____

Job Location - City: _____ State: _____ Created By: _____ Date: _____

Product: _____ Quote: _____ Customer Approval: _____ Date: _____

DESIGNATION, LOAD AND DIMENSIONAL DATA

DESIGN INFORMATION							POLE DIMENSIONS				DESIGNATION
	80 MPH w/1.3 GUST		90 MPH w/1.3 GUST		100 MPH w/1.3 GUST						
NOMINAL MOUNTING HEIGHT	MAX EPA[1] (SQ FT)	MAX WEIGHT[1] (LBS)	MAX EPA[1] (SQ FT)	MAX WEIGHT[1] (LBS)	MAX EPA[1] (SQ FT)	MAX WEIGHT[1] (LBS)	BASE OD (IN)	TOP OD (IN)	WALL THK (GA)	STRUCTURE WEIGHT[2] (LBS)	
20'-0"	19.3	482	15.1	377	12.2	305	5.90	3.10	11	140	590A200
	24.2	605	19.3	482	15.6	390	6.50	3.70	11	160	650A200
25'-0"	12.5	312	9.9	247	8.0	200	5.90	2.40	11	155	590A250
	20.3	507	16.2	405	13.1	327	7.00	3.50	11	200	700A250
	30.5	760	24.0	625	19.8	495	7.00	3.50	7	280	700E250
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	18.9	473	14.9	373	12.0	300	8.00	3.80	11	265	800A300
	33.5	838	27.0	675	22.0	550	8.00	3.80	7	380	800E300
35'-0"	11.2	280	8.9	222	7.1	177	7.30	2.40	11	250	730A350
	18.9	472	15.1	377	12.2	305	8.50	3.60	11	315	850A350
	23.2	580	18.2	455	14.5	363	9.50	4.60	11	370	950A350
39'-0"	10.7	267	8.5	212	6.6	165	7.82	2.40	11	285	782A389
	17.2	430	13.5	338	10.8	270	9.00	3.58	11	355	900A389
	28.5	715	23.0	575	19.0	475	9.00	3.58	7	515	900E389
45'-0"	17.4	435	13.5	338	10.6	265	10.00	3.70	11	450	T00A450
	28.5	715	23.0	575	19.0	475	10.00	3.70	7	650	T00E450
50'-0"	13.2	330	10.6	265	8.3	208	10.00	3.00	11	475	T00A500
	20.5	512	16.5	412	13.6	340	10.00	3.00	7	680	T00E500

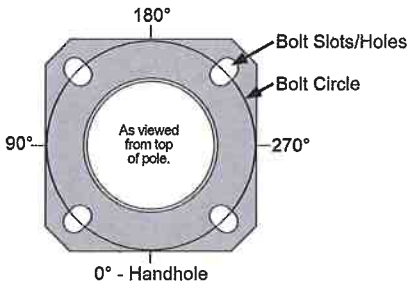
DS210 Heavy Duty poles available at valmontstructures.com

1. Maximum EPA (Effective Projected Area) and weight values are based on top mounted luminaires and/or brackets having a centroid 2'-6" above the Nominal Mounting Height. Variations from sizes above are available upon inquiry at the factory. Satisfactory performance of poles is dependent upon the pole being properly attached to a supporting foundation of adequate design.
2. Structure weight is a nominal value which includes the pole shaft and base plate only.

ANCHORAGE DATA

POLE		BASE PLATE				ANCHOR BOLTS		
		BOLT CIRCLE						
BASE OD (IN)	WALL THK (GA)	DIA (IN)	± (IN)	SQUARE (IN)	THK (IN)	DIA x LENGTH x HOOK (IN)	PROJECTION (IN)	± (IN)
5.90	11	9.00	0.50	10.00	0.875	1.00 x 36.00 x 4.00	4.13	0.25
6.50	11	9.50	0.50	10.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
6.60	11	9.50	0.50	10.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.00	11	10.00	0.50	10.88	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.00	7	10.00	0.50	10.88	1.000	1.00 x 36.00 x 4.00	4.25	0.25
7.30	11	10.50	0.50	11.25	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.82	11	11.00	0.50	11.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
8.00	11	11.00	0.50	11.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
8.00	7	11.00	0.50	11.50	1.250	1.25 x 42.00 x 6.00	5.00	0.25
8.50	11	11.50	0.50	12.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
9.00	11	12.50	0.50	12.38	1.000	1.00 x 36.00 x 4.00	4.25	0.25
9.00	7	12.50	0.50	12.38	1.250	1.25 x 42.00 x 6.00	5.00	0.25
9.50	11	13.00	0.50	13.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
10.00	11	13.50	0.50	14.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
10.00	7	13.50	0.50	14.00	1.250	1.25 x 42.00 x 6.00	5.00	0.25

Anchor Base Detail



PRODUCT ORDERING CODE

MODEL	DESIGNATION	FIXTURE MOUNTING	FINISH SYSTEM	STANDARD COLOR OPTIONS	BASE COVER	ANCHOR BOLTS	SUPPLEMENTAL INFO
DS210	850A350						
	Select Correct Designation from the *Load and Dimensional Data Chart.*	**Drill Mounting (See Orientation)** D1 = (1) Drilling @ 270° D2 = (2) Drillings @ 90° & 270° D3 = (3) Drillings @ 60°, 180°, & 300° D4 = (4) Drillings @ 0°, 90°, 180°, & 270° D5 = (2) Drillings @ 180° & 270° D6 = (3) Drillings @ 90°, 180°, & 270° **Tenon Mounting** P2 = 2.38" OD x 4" tenon P4 = 4.00" OD x 6" tenon P5 = 2.88" OD x 4" tenon P6 = 2.88" OD x 5" tenon P7 = 2.38" OD x 5" tenon P9 = Special Size (Specify) **Other Options** PC = Pole Cap PL = Plain Top (No Cap)	GV = Galvanized FP = Finish Painted -----OPTIONAL----- FPGV = Finish Paint over Galvanizing VP30 = V-PRO™ 30 System VP32 = V-PRO™ 32 System VP53 = V-PRO™ 53 System VP54 = V-PRO™ 54 System VP57 = V-PRO™ 57 System VP100 = V-PRO™ 100 System VP105 = V-PRO™ 105 System	GV = Galvanized BK = Black DB = Dark Bronze MB = Medium Bronze WH = White LG = Light Gray CB = Bronze DG = Dark Green ST = Sandstone HG = Hunter Green SG = Slate Gray SL = Silver SC = Special Color (Specify)	FBC = Full Base Cover -----OPTIONAL----- NC = Nut Covers 2T = Square Dart Cover DT = Dart Round Cover	AB = With Anchor Bolts LAB = Without Anchor Bolts	

Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES	**Catalog Number:** DS210-850A350-D2-FP-DB-FBC-AB Notes:	**Type:** C LAI19-169707

Submitted by LIGHTING ASSOCIATES

LIGHTING ASSOCIATES

Job Name:
(new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES
Architect: BRiC PARTNERSHIP (BELLEVILLE)
Engineer: OATES AND ASSOCIATES

Catalog Number:
GLEON-AF-03-LED-E1-T4W-BZ-MS/DIM-L40W
Notes:

Type:
D
LAI19-169707

ORDERING INFORMATION

Sample Number: GLEON-AF-04-LED-E1-T3-GM-QM

Product Family [1,2]	Light Engine	Number of Light Squares [3]	Lamp Type	Voltage	Distribution	Color	Mounting
GLEON=Galleon	AF=1A Drive Current	01=1 02=2 03=3 04=4 05=5 [4] 06=6 07=7 [5] 08=8 [5] 09=9 [5] 10=10 [6]	LED=Solid State Light Emitting Diodes	E1=120-277V 347=347V [7] 480=480V [7,8]	T2=Type II T2R=Type II Roadway T3=Type III T3R=Type III Roadway T4FT=Type IV Forward Throw T4W=Type IV Wide 5NQ=Type V Narrow 5MQ=Type V Square Medium 5WQ=Type V Square Wide SL2=Type II w/Spill Control SL3=Type III w/Spill Control SL4=Type IV w/Spill Control SLL=90° Spill Light Eliminator Left SLR=90° Spill Light Eliminator Right RW=Rectangular Wide Type I AFL=Automotive Frontline	AP=Grey BZ=Bronze BK=Black DP=Dark Platinum GM=Graphite Metallic WH=White	[Blank]=Arm for Round or Square Pole EA=Extended Arm [9] MA=Mast Arm Adapter [10] WM=Wall Mount QM=Quick Mount Arm (Standard Length) [11] QMEA=Quick Mount Arm (Extended Length) [12]

Options (Add as Suffix)

7030=70 CRI 3000K [13]
8030=80 CRI 3000K [14]
7050=70 CRI 5000K [13]
7060=70 CRI 6000K [13]
600=Drive Current Factory Set to Nominal 600mA [15]
800=Drive Current Factory Set to Nominal 800mA [15]
1200=Drive Current Factory Set to Nominal 1200mA [15,16]
F=Single Fuse (120, 277 or 347V. Must Specify Voltage)
FF=Double Fuse (208, 240 or 480V. Must Specify Voltage)
2L=Two Circuits [17,18]
DIM=External 0-10V Dimming Leads [19,20]
P=Button Type Photocontrol (120, 208, 240 or 277V. Must Specify Voltage) [21]
PER7=NEMA 7-PIN Twistlock Photocontrol Receptacle [21]
R=NEMA Twistlock Photocontrol Receptacle [21]
AHD145=After Hours Dim, 5 Hours [22]
AHD245=After Hours Dim, 6 Hours [22]
AHD255=After Hours Dim, 7 Hours [22]
AHD355=After Hours Dim, 8 Hours [22]
HA=50°C High Ambient [23]
MS/DIM-L08=Motion Sensor for Dimming Operation, Maximum 8' Mounting Height [24,25]
MS/DIM-L20=Motion Sensor for Dimming Operation, 9' - 20' Mounting Height [24,26]
MS/DIM-L40=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height [22,26]
MS/DIM-L40W=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height (Wide Range) [24,28]
MS/X-L08=Bi-Level Motion Sensor, Maximum 8' Mounting Height [24,26,29]
MS/X-L20=Bi-Level Motion Sensor, 9' - 20' Mounting Height [24,26,29]
MS/X-L40=Bi-Level Motion Sensor, 21' - 40' Mounting Height [22,27,29]
MS/X-L40W=Bi-Level Motion Sensor, 21' - 40' Mounting Height (Wide Range) [24,28,29]
MS-L08=Motion Sensor for ON/OFF Operation, Maximum 8' Mounting Height [24,25]
MS-L20=Motion Sensor for ON/OFF Operation, 9' - 20' Mounting Height [24,26]
MS-L40=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height [24,27]
MS-L40W=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height (Wide Range) [24,28]
LWR-LW=LumaWatt Pro Wireless Sensor, Wide Lens for 8' - 16' Mounting Height [30]
LWR-LN=LumaWatt Pro Wireless Sensor, Narrow Lens for 16' - 40' Mounting Height [30]
L90=Optics Rotated 90° Left
R90=Optics Rotated 90° Right
MT=Factory Installed Mesh Top
TH=Tool-less Door Hardware
LCF=Light Square Trim Plate Painted to Match Housing [31]
HSS=Factory Installed House Side Shield [32]
CE=CE Marking [33]

Accessories (Order Separately)

OA/RA1016=NEMA Photocontrol Multi-Tap - 105-285V
OA/RA1027=NEMA Photocontrol - 480V
OA/RA1201=NEMA Photocontrol - 347V
OA/RA1013=Photocontrol Shorting Cap
OA/RA1014=120V Photocontrol
MA1252=10kV Surge Module Replacement
MA1036-XX=Single Tenon Adapter for 2-3/8" O.D. Tenon
MA1037-XX=2@180° Tenon Adapter for 2-3/8" O.D. Tenon
MA1197-XX=3@120° Tenon Adapter for 2-3/8" O.D. Tenon
MA1188-XX=4@90° Tenon Adapter for 2-3/8" O.D. Tenon
MA1189-XX=2@90° Tenon Adapter for 2-3/8" O.D. Tenon
MA1190-XX=3@90° Tenon Adapter for 2-3/8" O.D. Tenon
MA1191-XX=2@120° Tenon Adapter for 2-3/8" O.D. Tenon
MA1038-XX=Single Tenon Adapter for 3-1/2" O.D. Tenon
MA1039-XX=2@180° Tenon Adapter for 3-1/2" O.D. Tenon
MA1192-XX=3@120° Tenon Adapter for 3-1/2" O.D. Tenon
MA1193-XX=4@90° Tenon Adapter for 3-1/2" O.D. Tenon
MA1194-XX=2@90° Tenon Adapter for 3-1/2" O.D. Tenon
MA1195-XX=3@90° Tenon Adapter for 3-1/2" O.D. Tenon
FSIR-100=Wireless Configuration Tool for Occupancy Sensor [24]
GLEON-MT1=Field Installed Mesh Top for 1-4 Light Squares
GLEON-MT2=Field Installed Mesh Top for 5-6 Light Squares
GLEON-MT3=Field Installed Mesh Top for 7-8 Light Squares
GLEON-MT4=Field Installed Mesh Top for 9-10 Light Squares
GLEON-QM=Quick Mount Arm Kit [10]
GLEON-QMEA=Quick Mount Extended Arm Kit [11]
LS/HSS=Field Installed House Side Shield [32,34]
WOLC-7P-10A=WaveLinx Outdoor Control Module (7-pin) [35]

NOTES:
1. Customer is responsible for engineering analysis to confirm pole and fixture compatibility for all applications. Refer to our white paper WP513001EN for additional support information.
2. DesignLights Consortium® Qualified. Refer to www.designlights.org Qualified Products List under Family Models for details.
3. Standard 4000K CCT and minimum 70 CRI.
4. Not compatible with MS/4-LXX or MS/1-LXX sensors.
5. Not compatible with extended quick mount arm (QMEA).
6. Not compatible with standard quick mount arm (QM) or extended quick mount arm (QMEA).
7. Requires the use of an internal step down transformer when combined with sensor options. Not available with sensor at 1200mA. Not available in combination with the HA high ambient and sensor options at 1A.
8. Only for use with 480V Wye systems. Per NEC, not for use with ungrounded systems, impedance grounded systems or corner grounded systems (commonly known as Three Phase Three Wire Delta, Three Phase High Leg Delta and Three Phase Corner Grounded Delta systems).
9. May be required when two or more luminaires are oriented on a 90° or 120° drilling pattern. Refer to arm mounting requirement table.
10. Factory Installed.
11. Maximum 8 light squares.
12. Maximum 6 light squares.
13. Extended lead times apply. Use dedicated IES files for 3000K, 5000K and 6000K when performing layouts. These files are published on the Galleon luminaire product page on the website.
14. Extended lead times apply. Use dedicated IES files for 3000K, 5000K and 6000K when performing layouts. These files are published on the Galleon luminaire product page on the website.
15. 1 Amp standard. Use dedicated IES files for 600mA, 800mA and 1200mA when performing layouts. These files are published on the Galleon luminaire product page on the website.
16. Not available with HA option.
17. 2L is not available with MS, MS/X or MS/DIM at 347V or 480V. 2L in AF-02 through AF-04 requires a larger housing, normally used for AF-05 or AF-06. Extended arm option may be required when mounting two or more fixtures per pole at 90° or 120°. Refer to arm mounting requirement table.
18. Not available with LumaWatt Pro wireless sensors.
19. Cannot be used with other control options.
20. Low voltage control lead brought out 18" outside fixture.
21. Not available if any "MS" sensor is selected. Motion sensor has an integral photocell.
22. Requires the use of P photocontrol or the PER7 or R photocontrol receptacle with photocontrol accessory. See After Hours Dim supplemental guide for additional information.
23. 50°C lumen maintenance data applies to 600mA, 800mA and 1A drive currents.
24. The FSIR-100 configuration tool is required to adjust parameters including high and low modes, sensitivity, time delay, cutoff and more. Consult your lighting representative at Eaton for more information.
25. Approximately 22' detection diameter at 8' mounting height.
26. Approximately 40' detection diameter at 20' mounting height.
27. Approximately 60' detection diameter at 40' mounting height.
28. Approximately 100' detection diameter at 40' mounting height.
29. Replace X with number of Light Squares operating in low output mode.
30. LumaWatt Pro wireless sensors are factory installed only requiring network components LWP-EM-1, LWP-GW-1 and LWP-PoE8 in appropriate quantities. See www.eaton.com/lighting for LumaWatt Pro application information.
31. Not available with house side shield (HSS).
32. Only for use with SL2, SL3, SL4 and AFL distributions. The Light Square trim plate is painted black when the HSS option is selected.
33. CE is not available with the LWR, MS, MS/X, MS/DIM, P, R or PER7 options. Available in 120-277V only.
34. One required for each Light Square.
35. Requires 7-pin NEMA twistlock photocontrol receptacle.

EATON
Powering Business Worldwide

Eaton
1121 Highway 74 South
Peachtree City, GA 30269
P: 770-486-4800
www.eaton.com/lighting

Specifications and dimensions subject to change without notice.

Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES	**Catalog Number:** GLEON-AF-03-LED-E1-T4W-BZ-MS/ DIM-L40W Notes:	**Type:** D LAI19-169707

Submitted by LIGHTING ASSOCIATES

Job Name:
(new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES
Architect: BRiC PARTNERSHIP (BELLEVILLE)
Engineer: OATES AND ASSOCIATES

Catalog Number:
DS210-850A350-D2-FP-DB-FBC-AB

Notes:

Type:
D

LAI19-169707

Poles - Steel | RTS / DS210 | Light Duty

ROUND TAPERED STEEL DS210
Light Duty

valmont STRUCTURES

Job Name: _____ Client Name: _____
Job Location - City: _____ State: _____ Created By: _____ Date: _____
Product: _____ Quote: _____ Customer Approval: _____ Date: _____

DESIGNATION, LOAD AND DIMENSIONAL DATA

DESIGN INFORMATION							POLE DIMENSIONS				DESIGNATION
	80 MPH w/1.3 GUST		90 MPH w/1.3 GUST		100 MPH w/1.3 GUST						
NOMINAL MOUNTING HEIGHT	MAX EPA[1] (SQ FT)	MAX WEIGHT[1] (LBS)	MAX EPA[1] (SQ FT)	MAX WEIGHT[1] (LBS)	MAX EPA[1] (SQ FT)	MAX WEIGHT[1] (LBS)	BASE OD (IN)	TOP OD (IN)	WALL THK (GA)	STRUCTURE WEIGHT[2] (LBS)	
20'-0"	19.3	482	15.1	377	12.2	305	5.90	3.10	11	140	590A200
	24.2	605	19.3	482	15.6	390	6.50	3.70	11	160	650A200
25'-0"	12.5	312	9.9	247	8.0	200	5.90	2.40	11	155	590A250
	20.3	507	16.2	405	13.1	327	7.00	3.50	11	200	700A250
	30.5	760	24.0	625	19.8	495	7.00	3.50	7	280	700E250
30'-0"	11.7	292	9.3	232	7.5	187	6.60	2.40	11	200	660A300
	18.9	473	14.9	373	12.0	300	8.00	3.80	11	265	800A300
	33.5	838	27.0	675	22.0	550	8.00	3.80	7	380	800E300
35'-0"	11.2	280	8.9	222	7.1	177	7.30	2.40	11	250	730A350
	18.9	472	15.1	377	12.2	305	8.50	3.60	11	315	850A350
	23.2	580	18.2	455	14.5	363	9.50	4.60	11	370	950A350
39'-0"	10.7	267	8.5	212	6.6	165	7.82	2.40	11	285	782A389
	17.2	430	13.5	338	10.8	270	9.00	3.58	11	355	900A389
	28.5	715	23.0	575	19.0	475	9.00	3.58	7	515	900E389
45'-0"	17.4	435	13.5	338	10.6	265	10.00	3.70	11	450	T00A450
	28.5	715	23.0	575	19.0	475	10.00	3.70	7	650	T00E450
50'-0"	13.2	330	10.6	265	8.3	208	10.00	3.00	11	475	T00A500
	20.5	512	16.5	412	13.6	340	10.00	3.00	7	680	T00E500

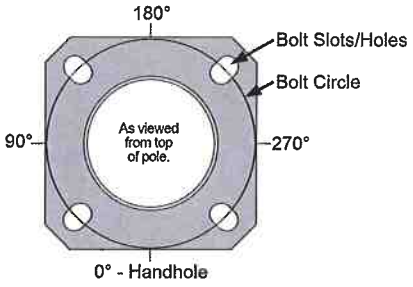
DS210 Heavy Duty poles available at valmontstructures.com

1. Maximum EPA (Effective Projected Area) and weight values are based on top mounted luminaires and/or brackets having a centroid 2'-6" above the Nominal Mounting Height. Variations from sizes above are available upon inquiry at the factory. Satisfactory performance of poles is dependent upon the pole being properly attached to a supporting foundation of adequate design.
2. Structure weight is a nominal value which includes the pole shaft and base plate only.

ANCHORAGE DATA

POLE		BASE PLATE				ANCHOR BOLTS		
		BOLT CIRCLE						
BASE OD (IN)	WALL THK (GA)	DIA (IN)	± (IN)	SQUARE (IN)	THK (IN)	DIA x LENGTH x HOOK (IN)	PROJECTION (IN)	± (IN)
5.90	11	9.00	0.50	10.00	0.875	1.00 x 36.00 x 4.00	4.13	0.25
6.50	11	9.50	0.50	10.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
6.60	11	9.50	0.50	10.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.00	11	10.00	0.50	10.88	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.00	7	10.00	0.50	10.88	1.000	1.00 x 36.00 x 4.00	4.25	0.25
7.30	11	10.50	0.50	11.25	0.875	1.00 x 36.00 x 4.00	4.13	0.25
7.82	11	11.00	0.50	11.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
8.00	11	11.00	0.50	11.50	0.875	1.00 x 36.00 x 4.00	4.13	0.25
8.00	7	11.00	0.50	11.50	1.250	1.25 x 42.00 x 6.00	5.00	0.25
8.50	11	11.50	0.50	12.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
9.00	11	12.50	0.50	12.38	1.000	1.00 x 36.00 x 4.00	4.25	0.25
9.00	7	12.50	0.50	12.38	1.250	1.25 x 42.00 x 6.00	5.00	0.25
9.50	11	13.00	0.50	13.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
10.00	11	13.50	0.50	14.00	1.000	1.00 x 36.00 x 4.00	4.25	0.25
10.00	7	13.50	0.50	14.00	1.250	1.25 x 42.00 x 6.00	5.00	0.25

Anchor Base Detail



PRODUCT ORDERING CODE

MODEL	DESIGNATION	FIXTURE MOUNTING	FINISH SYSTEM	STANDARD COLOR OPTIONS	BASE COVER	ANCHOR BOLTS	SUPPLEMENTAL INFO
DS210	850A350						
	Select Correct Designation from the *Load and Dimensional Data Chart.*	**Drill Mounting (See Orientation)** D1 = (1) Drilling @ 270° D2 = (2) Drillings @ 90° & 270° D3 = (3) Drillings @ 60°, 180°, & 300° D4 = (4) Drillings @ 0°, 90°, 180°, & 270° D5 = (2) Drillings @ 180° & 270° D6 = (3) Drillings @ 90°, 180°, & 270° **Tenon Mounting** P2 = 2.38" OD x 4" tenon P4 = 4.00" OD x 6" tenon P5 = 2.88" OD x 4" tenon P6 = 2.88" OD x 5" tenon P7 = 2.38" OD x 5" tenon P9 = Special Size (Specify) **Other Options** PC = Pole Cap PL = Plain Top (No Cap)	GV = Galvanized FP = Finish Painted -----OPTIONAL----- FPGV = Finish Paint over Galvanizing VP30 = V-PRO™ 30 System VP32 = V-PRO™ 32 System VP53 = V-PRO™ 53 System VP54 = V-PRO™ 54 System VP57 = V-PRO™ 57 System VP100 = V-PRO™ 100 System VP105 = V-PRO™ 105 System	GV = Galvanized BK = Black DB = Dark Bronze MB = Medium Bronze WH = White LG = Light Gray CB = Bronze DG = Dark Green ST = Sandstone HG = Hunter Green SG = Slate Gray SL = Silver SC = Special Color (Specify)	FBC = Full Base Cover -----OPTIONAL----- NC = Nut Covers 2T = Square Dart Cover DT = Dart Round Cover	AB = With Anchor Bolts LAB = Without Anchor Bolts	

Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES	**Catalog Number:** DS210-850A350-D2-FP-DB-FBC-AB Notes:	**Type:** D LAI19-169707

Submitted by LIGHTING ASSOCIATES			
LIGHTING ASSOCIATES	**Job Name:** (new) SIUE LOT A RECONSTRUCTION - LIGHT FIXTURES Architect: BRiC PARTNERSHIP (BELLEVILLE) Engineer: OATES AND ASSOCIATES	**Catalog Number:** FSIR-100-PK Notes:	**Type:** TOOL LAI19-169707

WATTSTOPPER | FIXTURE SENSORS & CONTROLS | ACCESSORIES | legrand®

WIRELESS HANDHELD CONFIGURATION TOOL | FSIR-100

Description

The FSIR-100 Wireless IR Configuration Tool is a handheld tool for remote configuration of IR-enabled fixture integrated sensors. The tool enables device modifications via pushbutton, without ladders or tools, and stores up to six sensor parameter profiles to speed configuration of multiple sensors.

Operation

Powered by three AAA batteries, the FSIR-100 features an easy-to-read organic LED (OLED) screen and bi-directional communication with IR-enabled fixture sensors. Its intuitive navigation pad provides a familiar interface for users who can see the current control parameters and make changes by navigating through simple menus. Adjustable sensor parameters include high and low modes, sensitivity, time delay, cut off and more. The FSIR-100 is also used to initiate automatic calibration of the ambient light level setpoint. The setpoint is used to hold the controlled lighting off or at low level when there is sufficient daylight.

IR Communication

The FSIR-100 uses bidirectional IR communication to send and receive sensor settings at mounting heights up to 40 feet. The device can display previously established sensor parameters, copy parameters and send new parameters or stored parameter profiles. For projects where identical settings may be desired across a large number of areas or spaces, this capability provides a streamlined method of configuration. Settings can be copied throughout a site, or in different sites.

Applications

Installers and end users can use the FSIR-100 for initial setup and subsequent sensor adjustement to ensure conformity with design intent. It simplifies changes to sensor settings by making the adjustment process ladder-free. It is compatible with IR-enabled Wattstopper HBP and FSP sensors. These products are ideal for use in parking facilites, gas station, pedestrian pathways and warehouse.

Features

- Establishes high and low mode light levels for 0-10V control
- Sets time delay, cut off time and sensitivity for motion detection
- Enables light level settings for either hold off control or daylighting control
- Initiates automatic setpoint configuration
- Allows ramp up and fade down rate adjustments
- Locks sensor settings to prevent unauthorized changes
- This product meets the materials restrictions of RoHS

PROJECT		LOCATION/ TYPE	

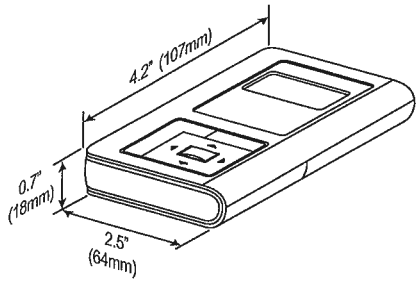
WWW.LEGRAND.US/WATTSTOPPER

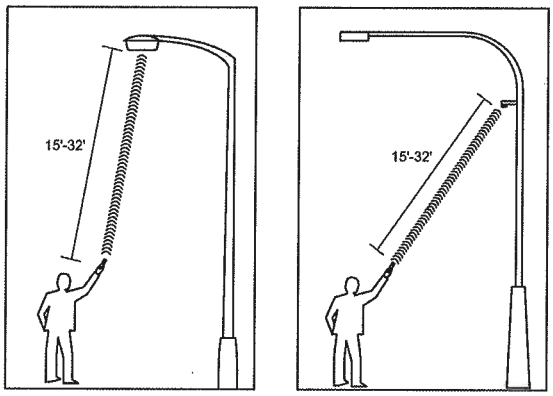
legrand®

Specifications

- Three AAA 1.5 volt batteries (included)
- OLED display 1.4"W x .75"H (36mm x 19mm)
- Infrared (IR) transceiver (36kHz frequency)
- IR range: up to 32' (10m)
- Includes carrying case with belt clip
- Operating temperature: 0-104°F (0-40°C)
- FCC part 15 compliant
- TUV EMC compliant
- Five year warranty

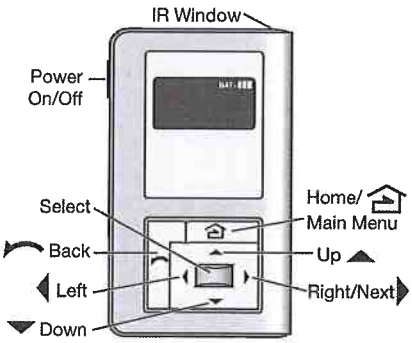
Dimensions & IR Coverage

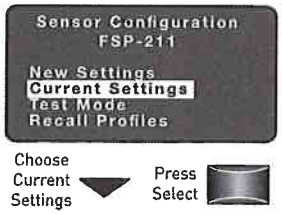




* Distance may vary depending on the lighting environment

Controls & Menus

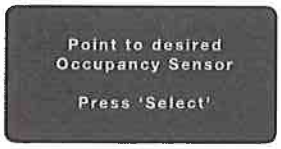




Choose Current Settings

Press Select

Press Select to View More Settings

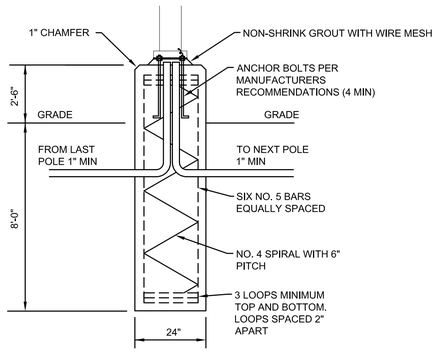


Point and Press Select

Typical FSIR-100 screens. Complete menu and navigation information is available in the FSIR-100 User Guide.

Ordering Information

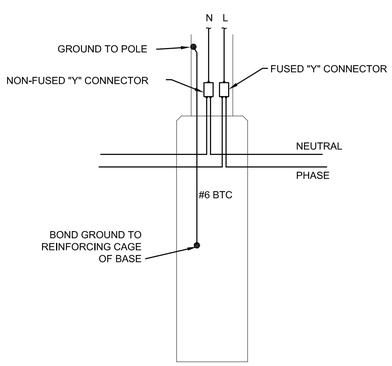
Catalog #	Description
☐ FSIR-100	Wireless Handheld Configuration Tool



NOTES:

1. ALL CONCRETE ABOVE GRADE SHALL BE HAND RUBBED TO A SMOOTH FINISH.
2. CONCRETE POLE BASE BY E.C. CONCRETE TO HAVE 3500 PSI MIN COMPRESSIVE STRENGTH AT 28 DAYS AND USE ASTM A615 GRADE 60 REINFORCING STEEL.

BASE DETAIL



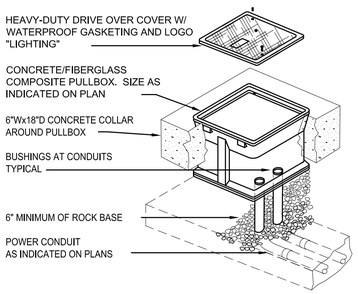
NOTES:

1. FUSED "Y" CONNECTOR TO BE FUSED AT 10 AMPS AND RATED FOR 600 VOLTS.
2. GROUND POLE AND NEUTRAL TO GROUND ROD USING CONDUCTOR INDICATED.
3. LOT A AND P-10: VOLTAGE IS 480 VOLTS PHASE-TO-NEUTRAL, 830 VOLTS PHASE-TO-PHASE. LOT CU: VOLTAGE IS 120 VOLTS PHASE-TO-NEUTRAL, 208 VOLTS PHASE-TO-PHASE.

WIRING DETAIL

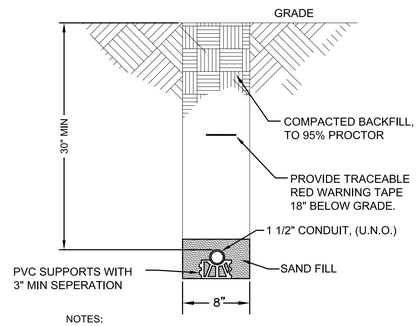
POLE BASE DETAILS - FIXTURES A AND B

NOT TO SCALE



SITE PULL BOX DETAIL

NOT TO SCALE

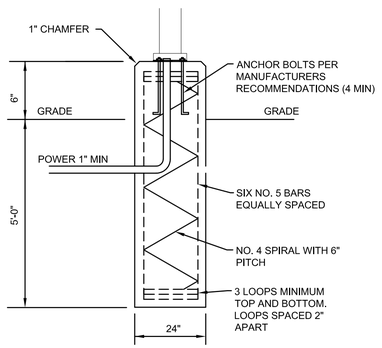


NOTES:

1. PAVEMENT PATCHING IN LOTS P-10 AND CREDIT UNION AS REQUIRED. UNLESS ALL CONDUIT RUNS ARE DIRECTIONALLY BORED WHERE UNDER ASPHALT PARKING LOTS. PATCH SHALL BE 2" THICK HMA ON PREPARED BASE.
2. E.C. IS RESPONSIBLE FOR TEMPORARY BACKFILL TO ORIGINAL GRADE WHEN ELECTRIC WORK IS BEFORE G.C. WORK BUT AFFECTED AREA IS STILL BEING USED/OPEN TO TRAFIC.

TRENCH DETAIL

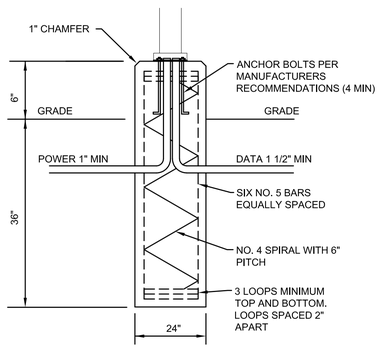
NOT TO SCALE



BASE DETAIL

ELECTRIC VEHICLE CHARGER BASE DETAIL

NOT TO SCALE



BASE DETAIL

CODE BLUE BASE DETAIL

NOT TO SCALE

LIGHT FIXTURE SCHEDULE

TYPE	OPT.	MANUFACTURER & CATALOG No.	VOLTAGE	LAMPS	MOUNTING	DESCRIPTION & REMARKS
A	1	McGRAW-EDISON GLEON-AF-03-LED-480-T4W-BZ-MS/DIM-L40W	480	LED INCLUDED	35' POLE	PROVIDE 35 FOOT ROUND TAPERED STEEL POLE, DARK BRONZE FINISH. PROVIDE POLE SHAFT SIZED FOR EPA OF 1 FIXTURES PLUS EPA LOAD OF 1.7 SQUARE FEET WITH 80 MPH WIND AND 1.3 GUST FACTOR. PROVIDE WITH FIXTURE MOUNTED MOTION SENSOR FOR DIMMING OPERATION. FOR POLES WHERE HALF AND FULL OPERATION IS INDICATED DELETE FIXTURE MOUNTED OCCUPANCY SENSOR.
	2	LITHONIA DSX1-P7-40K-T4M-480-RPA-PIRH-DDBXD				
	3	GE EALS03-5-J4AF-740-ND-D1-DKBZ-H				
	4	GARDCO ECF-S-48-1.2A-NW-G2-AR-4-480-BL-IMRI7-RPA-BZ				
	5	BEACON VP-L-80L-180-4K7-5W-480-A-DB				
B	1	(2) McGRAW-EDISON GLEON-AF-03-LED-480-T4W-BZ-MS/DIM-L40W	480	LED INCLUDED	35' POLE	2 FIXTURES AT 180°. PROVIDE 35 FOOT ROUND TAPERED STEEL POLE, DARK BRONZE FINISH. PROVIDE POLE SHAFT SIZED FOR EPA OF 2 FIXTURES PLUS EPA LOAD OF 1.7 SQUARE FEET WITH 80 MPH WIND AND 1.3 GUST FACTOR. PROVIDE WITH FIXTURE MOUNTED MOTION SENSOR FOR DIMMING OPERATION. FOR POLES WHERE HALF AND FULL OPERATION IS INDICATED DELETE FIXTURE MOUNTED OCCUPANCY SENSOR.
	2	(2) LITHONIA DSX1-P7-40K-T4M-480-RPA-PIRH-DDBXD				
	3	(2) GE EALS03-5-J4AF-740-ND-D1-DKBZ-H				
	4	(2) GARDCO ECF-S-48-1.2A-NW-G2-AR-4-480-BL-IMRI7-RPA-BZ				
	5	(2) BEACON VP-L-80L-180-4K7-5W-480-A-DB				
C	1	McGRAW-EDISON GLEON-AF-03-LED-E1-T4W-BZ-MS/DIM-L40W	120	LED INCLUDED	35' POLE	PROVIDE 35 FOOT ROUND TAPERED STEEL POLE, DARK BRONZE FINISH. PROVIDE POLE SHAFT SIZED FOR EPA OF 1 FIXTURES PLUS EPA LOAD OF 1.7 SQUARE FEET WITH 80 MPH WIND AND 1.3 GUST FACTOR. PROVIDE WITH FIXTURE MOUNTED MOTION SENSOR FOR DIMMING OPERATION. FOR POLES WHERE HALF AND FULL OPERATION IS INDICATED DELETE FIXTURE MOUNTED OCCUPANCY SENSOR.
	2	LITHONIA DSX1-P7-40K-T4M-MVOLT-RPA-PIRH-DDBXD				
	3	GE EALS03-0-J4AF-740-ND-D1-DKBZ-H				
	4	GARDCO ECF-S-48-1.2A-NW-G2-AR-4-UNV-BL-IMRI7-RPA-BZ				
	5	BEACON VP-L-80L-180-4K7-5W-UNV-A-DB				
D	1	(2) McGRAW-EDISON GLEON-AF-03-LED-E1-T4W-BZ-MS/DIM-L40W	120	LED INCLUDED	35' POLE	2 FIXTURES AT 180°. PROVIDE 35 FOOT ROUND TAPERED STEEL POLE, DARK BRONZE FINISH. PROVIDE POLE SHAFT SIZED FOR EPA OF 2 FIXTURES PLUS EPA LOAD OF 1.7 SQUARE FEET WITH 80 MPH WIND AND 1.3 GUST FACTOR. PROVIDE WITH FIXTURE MOUNTED MOTION SENSOR FOR DIMMING OPERATION. FOR POLES WHERE HALF AND FULL OPERATION IS INDICATED DELETE FIXTURE MOUNTED OCCUPANCY SENSOR.
	2	(2) LITHONIA DSX1-P7-40K-T4M-MVOLT-RPA-PIRH-DDBXD				
	3	(2) GE EALS03-0-J4AF-740-ND-D1-DKBZ-H				
	4	(2) GARDCO ECF-S-48-1.2A-NW-G2-AR-4-UNV-BL-IMRI7-RPA-BZ				
	5	(2) BEACON VP-L-80L-180-4K7-5W-UNV-A-DB				

NOTE: SUBSTITUTIONS SHALL NOT BE ACCEPTED UNLESS SUBMITTED TO THE ARCHITECT/ENGINEER MINIMUM TWO WEEKS PRIOR TO THE BID DATE.

ISSUED FOR CONSTRUCTION

REVISIONS:

NO.:	DATE:	REMARKS:
1	2/8/2019	ADDENDUM 1
2	2/12/2019	ADDENDUM 2

100 Lanter Court, Suite 1
Collinsville, IL 62234
618.345.2200
www.oatesassociates.com
Collinsville St. Louis Belleville St. Charles
ILLINOIS DESIGN FIRM LICENSE NO.: 184.001115

OATES ASSOCIATES

SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE

PARKING LOT RECONSTRUCTION

SCHEDULES AND DETAILS

ERIC R. ROGERS
062-050663
REGISTERED PROFESSIONAL ENGINEER OF ILLINOIS

EXP. 11/30/2019

PROJECT NO.: 14003.053

DATE: 4/26/2019

SHEET NO.: E2.0

GRAPHIC SCALE FIGURES:

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SECTION 270000 –TELECOMMUNICATIONS GENERAL

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Refer to SIUE ITS document “IT Standards and Services for New Building Construction and Renovation of Existing Spaces” for telecommunication requirements.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 270000

SECTION 280000 - ELECTRONIC SECURITY GENERAL

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Refer to SIUE ITS document “IT Standards and Services for New Building Construction and Renovation of Existing Spaces” for telecommunication requirements.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 280000

SECTION 283100 - FIRE ALARM AND DETECTION SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Fire alarm and detection systems

B. One-way emergency communications system with voice notification within-building, wide-area, and distributed recipient coverage.

1.2 SYSTEM DESCRIPTION

A. Performance Statement: Based on the equipment described and the performance required of the system, as presented in these documents, the Vendor and the Contractor are solely responsible for determining all wiring, programming and miscellaneous equipment required for a complete and operational system.

B. This section of the specifications includes the furnishing, installation and connection of the microprocessor controlled, intelligent reporting, fire alarm equipment required to form a complete coordinated system that is ready for operation. It shall include, but is not limited to, alarm initiating devices, voice evacuation equipment, emergency communication systems, control panels, auxiliary control devices, annunciators, power supplies, and wiring.

C. Integrating/Interfacing/Extending the existing fire alarm system (where applicable): Provide all items, components, devices, hardware, software, programming, expansion components, conduit, wiring etc. needed to integrate interface extend the existing fire alarm system with the new fire alarm system. This includes, but is not limited to, additional power supplies, initiating devices and circuits, signaling devices and circuits, monitoring devices and circuits, auxiliary control and related devices such as, door holders and their control, smoke damper control, fan shutdown, etc. The existing fire alarm system shall be integrated/interfaced/extended with the new fire alarm system such that the existing fire alarm system's functionality, integrity and annunciation shall be equivalent to pre-construction conditions unless noted otherwise. The functionality and integrity shall be maintained during construction. The entire system shall be able to be completely reset from any single reset location point. The entire system shall be annunciated at any annunciation location.

D. Extending the existing fire alarm system: The existing control panel shall remain and shall be operational throughout construction. The system shall only be disabled to make new connections and to modify the programming. A fire watch shall be provided for all areas affected during outages. All system outages must be scheduled with the Owner at least one week prior. Individual devices may be disabled as needed based on construction activities to reduce the potential for false alarms, but all devices must be operational when the Contractor is not physically on site. New initiating devices may be connected to the existing

signaling line circuits where capacity is available. Provide additional signaling line circuits as needed based on existing and new device quantity, including replacement of existing panel components. Provide new notification circuits to serve the new devices, including all necessary power supplies, amplifiers, batteries, and 120 volt input circuits. All new devices shall be programmed to provide the same sequence of operation as the existing devices of the same type, unless noted otherwise.

E. Fire Alarm System: NFPA 72; Automatic and manual fire alarm system, non-coded, analog-addressable with automatic sensitivity control of certain detectors, multiplexed signal transmission.

F. Campus Ethernet IP Network: A complete fire alarm and mass notification Ethernet network shall be provided. The network (primary) shall be Class X, Resilient Ethernet Protocol (REP) 100BaseTX / 100 Mbps that shall be able to operate with any single break and self-restoring network communications. Secondary communication provided through the Telephone LAN system. Each building shall contain an independent building fire alarm / voice communications system, with full command and control from the campus command center. In no case shall read only network annunciation be acceptable as the only networking function. In-Building Network (where applicable): A complete fire alarm system network shall be provided. Provide quantity of control panels as necessary. The network shall be a Style 7 token ring, peer-to-peer network. The network shall be characterized by simultaneous or sequential transmission, or both, and reception of multiple signals on a signaling line circuit or communication channel. The distributed intelligent characteristic of the network shall provide for all nodes independently making pertinent system decisions with no need for a central controller. Each node shall be capable of independent operation should loss of network communications occur. In no case shall read-only network annunciation be acceptable as the only networking function.

G. Voice Communication (where required): The facility shall have an emergency voice alarm communication system. The digitized recorded voice message shall notify occupants that a fire condition has been reported. Emergency manual voice override shall be provided.

H. Firefighter Phone System: A two-way talk path shall be provided for the fire department's use from the voice command center to the secondary fire alarm attack entrances, elevator lobbies, primary and backup power rooms and the entrance to all enclosed stairways.

An allowable alternate to the Firefighter Phone System would be: Provide an emergency responder radio coverage in buildings. All buildings shall have approved radio coverage for emergency responders within the building based upon the existing coverage levels of the public safety communication systems of the jurisdiction at the exterior of the building. This section shall not require improvement of the existing public safety communication systems.

I. Emergency Communication System (ECS): A system capable of reproduction of prerecorded, synthesized, or live messages with voice intelligibility to indicate the existence of an emergency situation and communicating information necessary to

facilitate an appropriate response and action. The system shall provide alerting in the building, wide-area notification on the campus and interface with distributed recipient mass notification system.

1.3 INSTALLATION

A. General Installation Requirements:

1. All fire alarm system installations shall have “Tech Electronics” (314-645-6200) involved at the very onset of the project/bidding process.

2. Ceiling mounted devices shall be white in color with red letters.

3. Wall mounted devices shall be red in color with white letters.

4. Fire alarm system requires a Bosch B456 dual path communicator with a Bosch B44-A cellular communicator - separate from the other communication systems.

5. All duct detectors shall provide a “Supervisory” notification and NOT an “Alarm”.

6. An electric bell to be mounted on building exterior.

7. Fire alarm system will require integration with the existing Radionics Receiver (“Linell”) to communicate with the local campus police station.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Simplex

B. Notifier by Honeywell

C. Siemens Fire Safety

END OF SECTION 283100

SECTION 321216 – ASPHALT PAVING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Design bicycle paths to be consistent with Madison County Transit trail standards.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 321216

SECTION 321313 – CONCRETE PAVING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide width, thickness and reinforcing in concrete walks to support maintenance vehicles and snow clearing equipment. Provide transitions at intersections sufficient for vehicle turns.

B. Paths of exposed aggregate concrete will be considered by the Campus Architect on a case-by-case basis.

C. Concrete pavement of appropriate thickness shall be used in the construction of the service drives.

D. Pathways that cross the main roads shall have an accessible sloped concrete transition between the path and the roadway, built in accordance with the latest version of the Illinois Accessibility Code.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 321313

SECTION 329113 – SOIL PREPARATION

PART 1 - GENERAL (Not Used)

PART 2 - PRODUCTS

2.1 PLANTING SOILS

A. Apply 2 inches of compost to specified depth of topsoil and till into the soil to a depth of 4 inches. Topsoil should then be firmed but not compacted and raked smooth. Do not roll the topsoil.

B. Drag area planted with grass seed with chain link fence or similar material after seeding to achieve maximum contact of seed with soil. Seed should be covered with 1/4” of soil.

C. If compatible with construction schedule include requirement to overseed and fertilize planted area in Fall (September or October).

D. Seed with blended turf type Fescue at a seeding rate of 8-10 lbs/11,000 sf.

E. Seed should be covered with a layer of straw to prevent erosion and to assist with moisture retention.

F. 80% of the area should be covered with Fescue turf after one growing season.

END OF SECTION 329113

SECTION 334100 – STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Connect all downspouts to storm sewer.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 334100