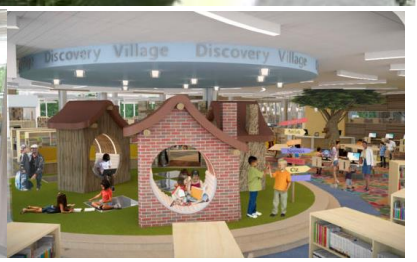
HYATTSVILLE BRANCH LIBRARY

PSU AE Thesis 2019

Ari DiMaria
Lighting/Electrical

Hyattsville Branch Library

Building Statistics	Design & Construction Team
Stories: 1 Story Library with 1 Level Parking Garage Size: 40,258 sqft. Library & 46,314 sqft. Parking Garage Cost: $27,970,244 estimate Construction Timeline: Not started yet, Goal to start in Spring 2018	Owner: Prince George's County Memorial Library System Architect: Grimm & Parker MEP: Weigand Associates Civil: Adtek Engineers, Inc. Structural: Restl Designers



Architecture	Lighting	Other
• Multi-leveled, metal deck roof • Terra-cotta, metal panel, and glass curtain facades • Raised patio above entrance to parking garage	• All LED lighting • Daylighting from curtain walls and clerestories • Dimming and occupancy sensors used throughout for energy savings	• Rooftop PV array • Green roof system on each side of lower roof. • Rooftop AC units with DX cooling and VAV fans for distribution

Table of Contents

Executive Summary

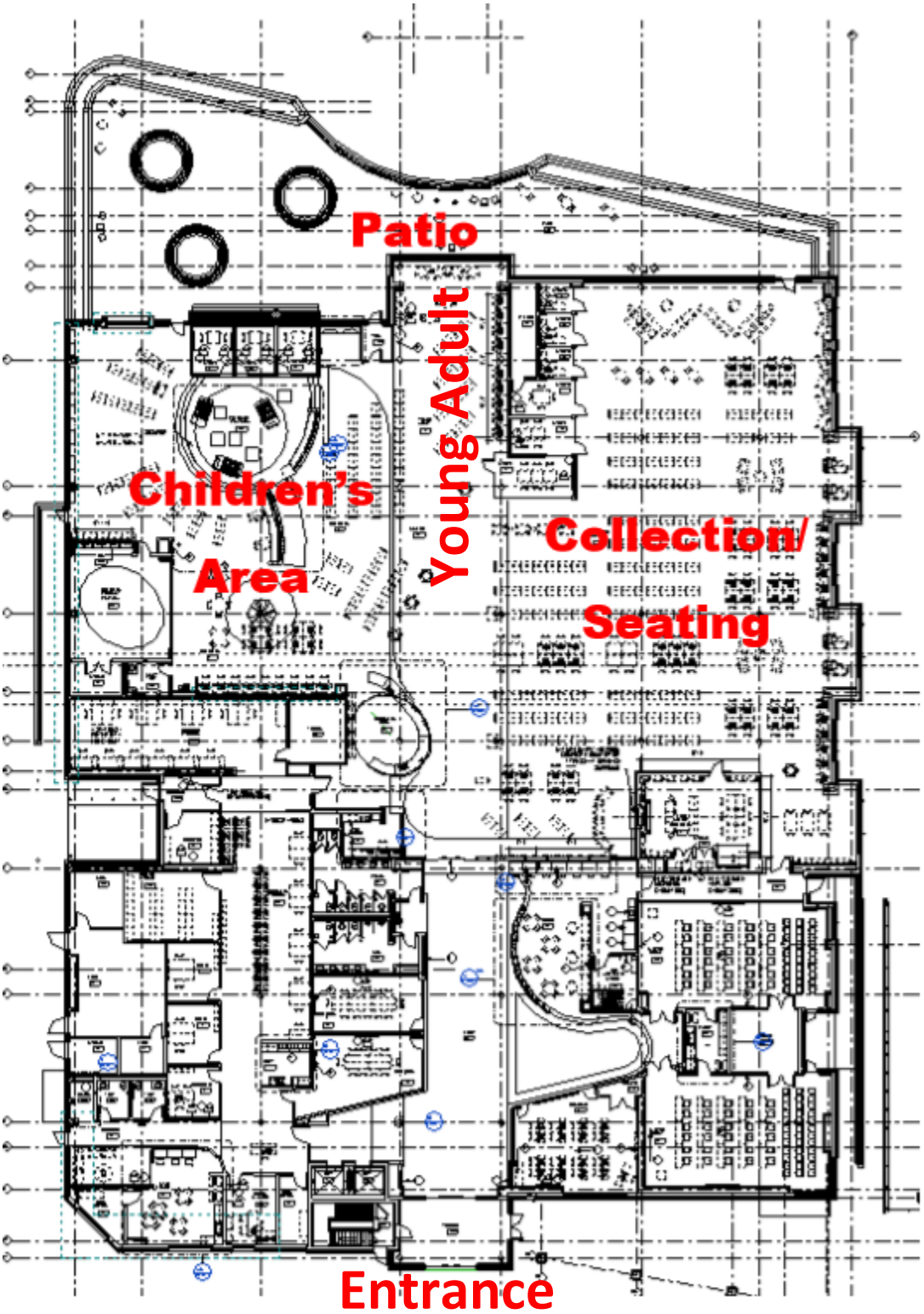
In the past libraries, along with many other municipal buildings, have typically been designed in America to be monuments with columns and other architectural feature found in Greek and Roman buildings. The Hyattsville Branch Library is quite the opposite, a brave and innovative modern design that takes advantage of solar power, natural daylighting, free roof space for green rooves, efficient building systems, and new and exciting LED luminaires. Hyattsville Branch Library is a technologically advanced building that has been designed to provide a myriad of public resources for anyone who cares to visit. This report explains how the lighting design in four major areas of the building were redesigned, complete with recommendations and calculations on the practicality of the new design. In addition, parts of the electrical system have been redesigned including the addition of vehicle charging stations and the replacement and relocating of some heater loads in the electrical system. The new heaters chosen have less demand than the previous heaters without compromising their purposes. There were also calculations done to find the possible short circuit voltages and voltage drops of the system as a whole.

Building Background

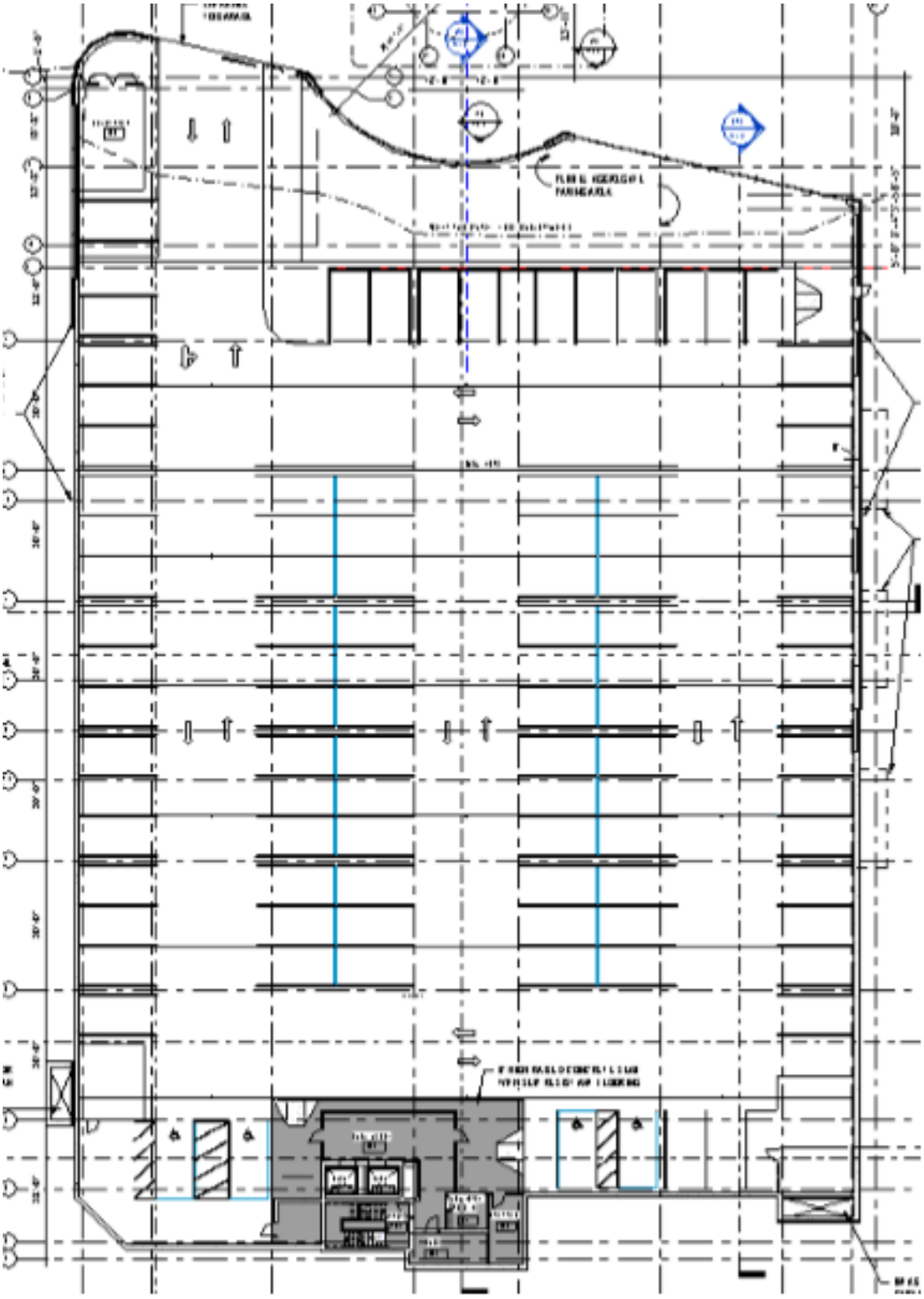
Hyattsville Branch Library was designed to not only replace the old library in Hyattsville, Maryland, but to be a public meeting space that is welcoming to all age groups and different types of people. The library will be 40,258 square feet, single story and will have a partially underground, basement parking garage below the library's footprint, that is 46,314 square feet. The library will be surrounded by roads with a drop-off circle on the south side of the building and the entrance to the parking garage on the northwest end of the building. The elevators and stairs to reach the main floor from the parking garage are located on the south side of the garage as to keep the same flow of visitors on the library floor. The project is estimated to cost $27,970,000, but has no current construction timeline other than possibly beginning this spring.

Another feature of the Hyattsville Branch Library design is that it has a multileveled metal deck roof with the highest section in the center creating a spine down the center of the building with clerestory windows along the both sides. The roof also has sections dedicated to being green roofs as well as a 40.2kW photovoltaic array on the west half of the roof. The walls are a combination of terra-cotta bricks, metal panels, and glass curtain facades. There is also planned to be a raised patio above the entrance to the parking garage to the north. The patio contains multiple planters for trees and flowers and overlooks a garden area outside, complete with vegetation and a modern gazebo.

Furniture Floor Plan



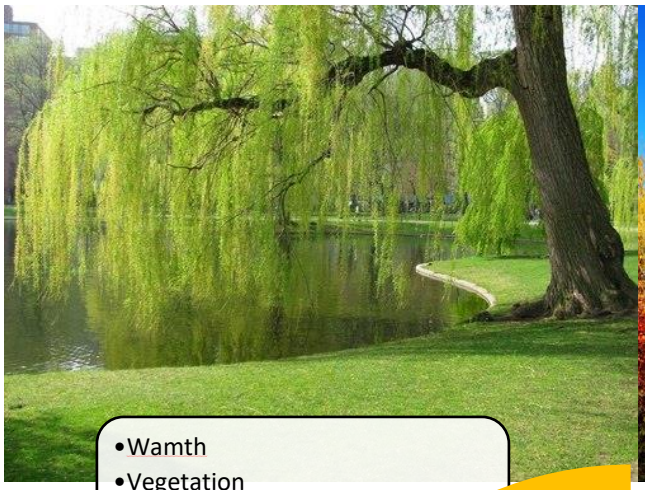
Garage Floor Plan

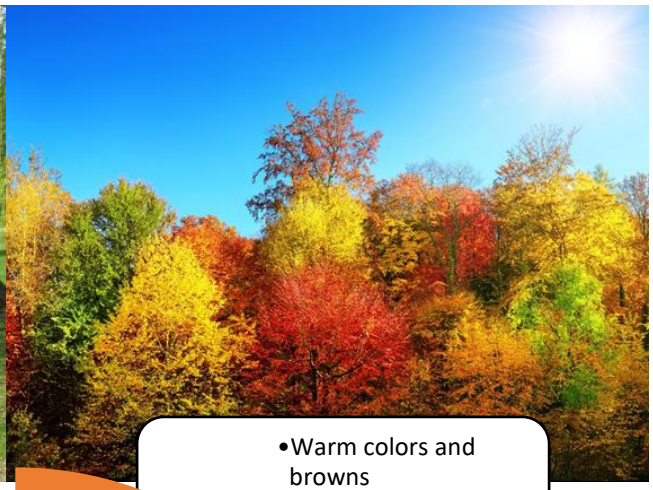


Lighting Depth Introduction

The architect, Grimm & Parker, have the main goal to design the Hyattsville Branch Library as a technologically advanced place that is welcoming to anyone wanting to take advantage of the public resources the library will provide. The main floor is set up in the following way. As people walk or drive up to the southern entrance, they can see a large box of glass which draws people into the vestibule. From there, a hallway from the southern entrance leads along the spine of the building, north, with an area to sit and exits out to the conference rooms, meeting rooms, and offices for the community and library employees. Going north through the main hallway, the occupant will open a door to see the circulation desk immediately to his left. Continuing strait, the visitor will enter a large open room with the main collection and seating area for adults to the right, a children's area to the left, and finally the young adult section nestled in between, near the north wall. On each side (adult and children's area) there is a door on the north façade that allows the visitor to go outside to the patio to relax or look out over the garden.

For my lighting redesign, I focused primarily on the entrance, circulation hallway, children's area, and main collection/seating area. Since there are many ages of people visiting the library it is very important to provide a verity of lighting to support the tasks that will be completed in the space. These tasks include walking through isles looking for a book, sitting/relaxing, reading at chairs and desks, working on computers, studying, and even playing with toys for the specific area for preschoolers. Each of these tasks require different light levels and solutions, which has been tested and calculated using AGi 32 illuminance calculations. In addition to reinforcing the idea of being welcoming to all using lighting, I designed the lighting in the four spaces I focused on to represent the four seasons. Each season evokes specific feelings towards them as well as linking together to mirror the cycles of life. Also, celebrating the seasons is very relevant to Maryland, as the location is such that citizens experience each season almost equally.





- Wamth
- Vegetation
- Sunny
- Beach

- Warm colors and browns
- Changing nature
- Transitional

Summer (Children's Area)

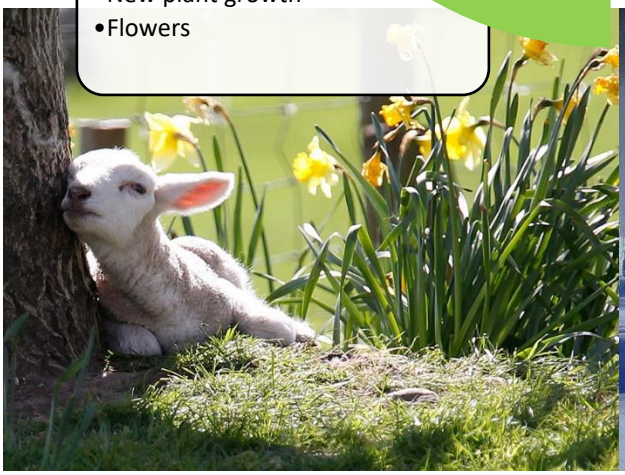
Fall (Young Adult/ Circulation)

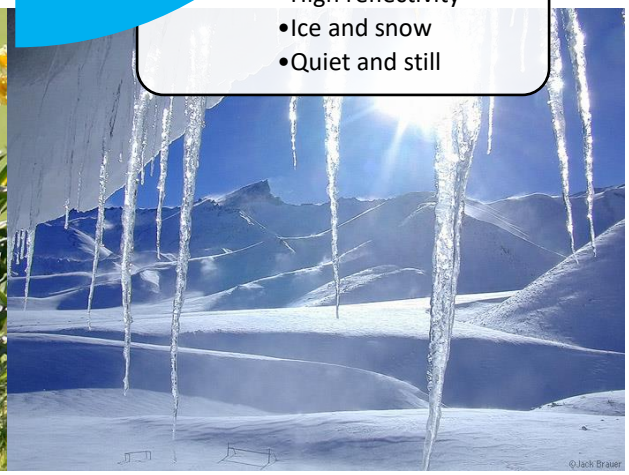
Spring (Entrance)

Winter (Main Collection/ Seating)

- Bright/pastel colors
- New plant growth
- Flowers

- Blues and white
- High reflectivity
- Ice and snow
- Quiet and still





Lighting Area 1 – Entrance

The entrance on the south façade is the main way to get in and out of the library, so it is very important that the area is appealing and attracts pedestrians and drivers alike, during all times of day. Even though libraries are primarily used during the day, with the addition of community meeting rooms and computer labs, it is likely that the library will be open much later in order to continually provide public services. During the day this area needs no additional lighting to support the natural daylighting. In the evening and night however, additional lights have been added to either side of the entrance for the safety of pedestrians approaching the library. The large box of glass, which encloses the vestibule allows for light to spill out onto the sidewalk both providing general illumination right outside and creates a focal point of higher light levels that draws visitors into the library.

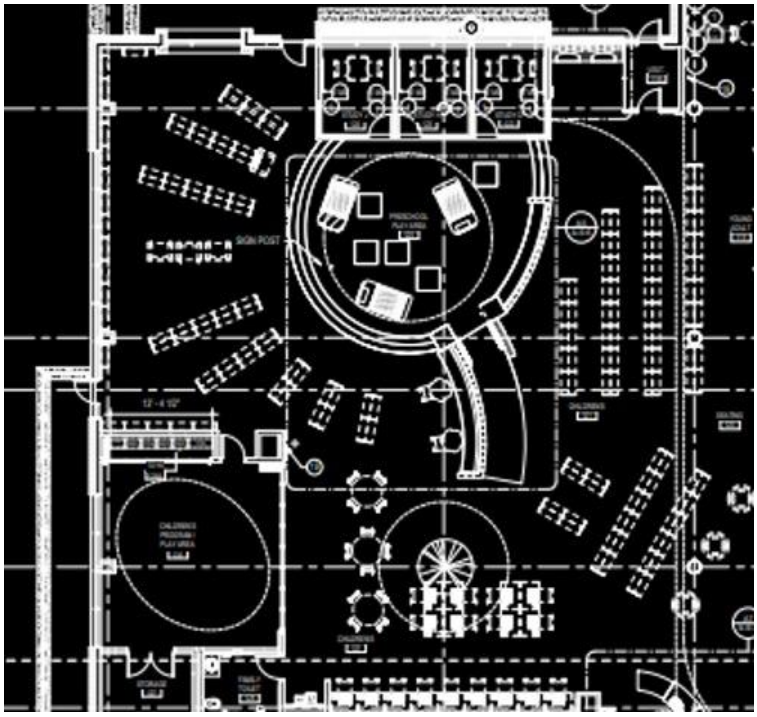
The entrance is representative of the spring season because the entrance of a building is the beginning of the occupant's experience with the spaces, just as the spring is the beginning of most life in nature. This concept is further supported by the lighting by having the greatest illuminance coming from the vestibule encouraging visitors to begin their journey into the building. The lower light levels on the paths to the entrance were decided by looking at recommendations in the IES Handbook for covered and not covered entryways with medium activity, since the library will be built next to an existing shopping center with a decent amount of traffic.

Image created by Grimm & Parker

Lighting Area 2 – Children's Area / Preschool Play Area

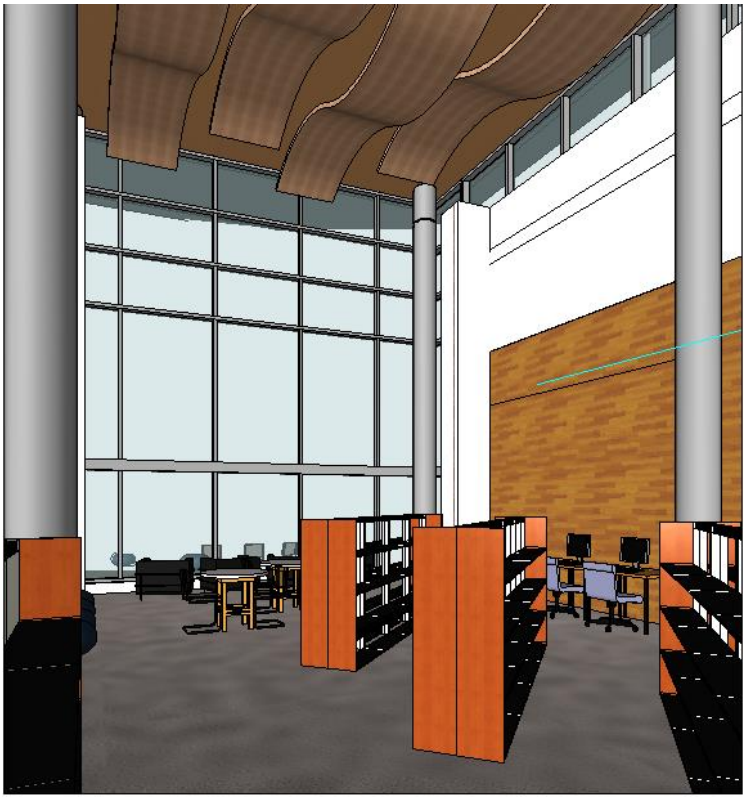
The children's area of Hyattsville Branch Library is located to the west of the center of the building and part of the large open area that contains all of the library stacks, except for the local history books, which have their own room. The south end of the children's area has computer desks and tables to sit, which provides a place for parents and children to read, relax, or work on the computers. In the south west corner is a partially enclosed raised area which is labeled the preschool play area with toys and games for children to play with. The book stacks in the space are spread out and seem to circle another raised area with toy houses that children can explore and play in as well as sit in to read, for older children. Finally, to the north of the area there are three private study rooms and a door out to the patio. A verity of general illumination provided by pendants as well as task lighting is used to provide appropriate light levels for the wide assortment of tasks that will take place in the area from playing with toys to working on the computers. Also, like the other areas with book stacks, a stack luminaire is used to provide illuminance directly onto the sides of the books to make it easy to find the book one is looking for. Additional illuminance is provided by natural light from windows on the west façade and a curtain wall on the north façade. Although the luminaires have been changed from the original design, there will still be controls in place to dim the pendant luminaires that will be close enough to the windows in order to maintain fairly constant light levels at different times of the day.

The children's area represents the summer, since childhood is the next stage of life after birth and the summer also comes after the spring. In nature, summer is the time for growth and reflection, so the fixtures for the space were chosen to both look natural and create a nonuniform wash of light over the space, which is representative of light spilling through the trees in the woods. In addition, the pendants of various geometric shapes are included to provide this uneven light as well as encourage education in children who are learning their shapes, which is another source of growth. In the preschool play area and raised platform with the toy houses, it is more important to have an even distribution of light as to keep children safe while playing by properly illuminating anything that could be tripped over or ran into.



Lighting Area 3 - Young Adult's Area / Circulation

This space is twelve feet wide an extends from the vestibule, all the way to the young adult section at the northernmost part of the library. After entering the building, a visitor goes strait past the offices and conference rooms to a door that leads into the large open collection area. Then this space (characterized by the high roof that extends al the way through the space) extends through the center of the open area, splitting the room into the children's and adult's area. Immediately after entering the open space, a visitor may stop at the circulation desk to ask questions, which is also on the way out when he is ready to rent a book. The circulation desk also, acts as a focal point to draw attention, because more illuminance is required on the circulation desk than the general lighting which allows visitors to find it easily. The purpose of most of the space is as a transitional space, which only needs general lighting and is supported during the day by clerestory windows that stretch along the entirety of this space on both sides. Additional general illumination is provided by pendants and set to dim down when the amount of natural light can contribute to the overall light levels. On the north side of this space however, there is the young adult section. Although smaller than the children's and adult's area, the are similar tasks that take place, such as looking at stacks, sitting to work or read at tables, and using computers. There is also a large curtain wall on the north end of the space allowing natural light to come in as well as a view to the patio and garden outside.



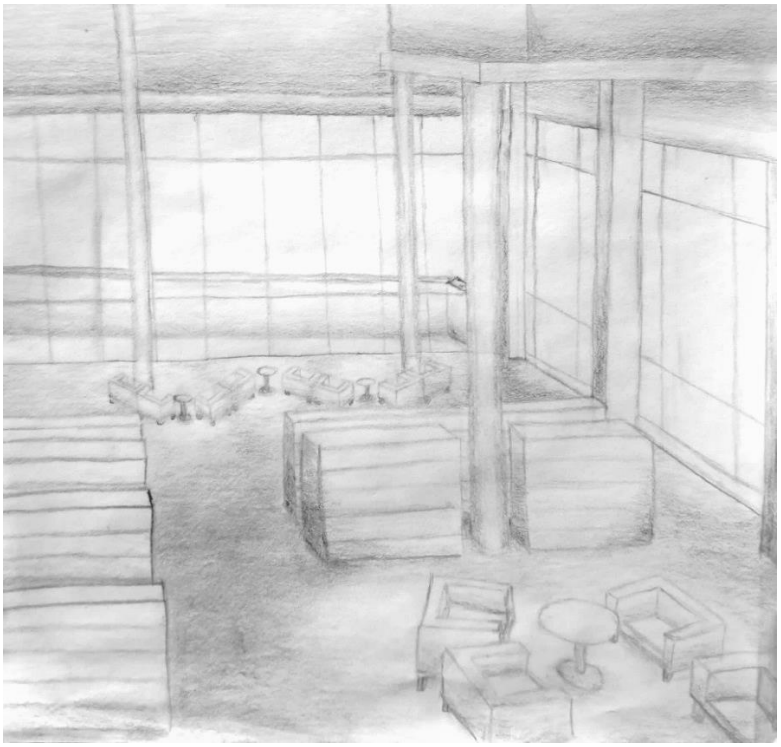
The young adult / circulation area represents the fall in two ways. The fall is a time where the leaves on the trees are changing and the animals prepare for the coming winter. This is mirrored in the changing nature of the point in a teen's life where they are between childhood and adulthood. Also, this space must be traveled through physically in the library to get to each collection area, which also represents the transitions from one season to the next. To further support my theme, I selected luminaires that had a dynamic feel to them or were irregular in shape.

Image created by Grimm & Parker

Lighting Area 4 – Main Collection / Seating Area

The Main Collection and Seating Area is the largest section of the large open space, which is to the east of the transitional space. The stacks in this space are in parallel groups of lines which are separated by groups of tables for sitting and desks for using the computers. Like the other collection areas, there are stack luminaires illuminating the books directly while additional general illumination is provided by pendants hanging from the ceiling. In areas with table and chairs, more task lighting is provided for visitors who want to relax and read. Again, a large curtain wall on the north side of the space provides indirect daylight into the space as well as a view and door to the patio. Also, there are skylights and windows facing east which will create areas that are very well naturally lit in the morning. The general illumination from the windows and supporting pendants will create a public feel with uniform illuminance. This public feel is very good at strengthening the architect's vision of being hospitable to all kinds of people, especially since if a visitor needs more privacy, they are welcome to use the more private feeling study rooms in the north west corner of the space.

The main collection/seating area is meant to represent the winter. This is the logical season to represent this space as it is connected to the children's area by the young adult section and the winter comes after the fall. The general illumination of the space along with reflective light surfaces is not unlike the look from light bouncing off the snow in the winter. The large amount of daylight that enters the space is a cooler light source by nature which mirrors the feeling of the winter sun and some luminaires were also chosen to sparkle, like ice reflecting the sunlight.



Electrical Depths Introduction

The Electrical Distribution System

The electricity for the building is supplied from a utility transformer that provides 480/277V electricity to the building. There is also a standby generator and PV array that are connected to the electrical system by automatic transfer switches that switch between utility power and one of the alternative sources. After an ATS, wiring goes to branch panels that are 480/277V and either connect to loads of that voltage or transformers that drop the voltage to 208/120 for other loads. All electrical devices are UL listed. The electrical system has a surge protection device on the main distribution panel as well as each branch circuit panel. Each branch panel has 42 circuits for bolt on breakers and copper bussing. Most wires in the building are copper and THHN/THWN, minimum 12 gage. Conduit must be at least ¾" above grade or 1" in diameter if below grade. At least one receptacle is present in every space. One receptacle is positioned every 12 feet in open offices and every 30 feet in corridors. Receptacles within 6 feet of plumbing devices or pipes are GFI protected. Charging for electrical vehicles is present in the parking garage, which is also where the standby generator is located.

Service Entrance Equipment

Ductbank runs along the west side of the building, from the utility pole on the northwest side of the building to the utility transformer. The utility transformer is pad mounted in the southwestern part of the parking lot outside the main entrance to the library. The voltage is dropped to 480/277V by the transformer and delivered to the main electrical room in the southwestern corner of the building. The 3 groups of 4 #600MCM current carrying conductors with 1 #3 Ground wire per group, that is delivered to the electrical room is also encased in ductbank that is 4 inches in diameter for each. Once in the building, the conductors go into the main switch board with a 1200A GFI MCB and distributes power to the entire building. The emergency lighting, elevators and other life safety loads are connected to automated transfer switches that receive power from either the MSB (utility) or the generator in the most north room of the basement parking garage. There is also a meter on the MSB that can be monitored by the owner.

Main Electrical Equipment

The main electrical room is part of the southwest part of the first floor of the building and contains many of the electrical distribution devices. The main switch board as well as two transformers, seven panels, and the solar panel equipment is all in the main electrical room. Another transformer and six panels are contained in a nearby 2-hr fire rated closet that is also on the first floor. A room along the north wall of the first floor, called IT/ELEC ROOM #118

contains another transformer and three panels. The solar panel array is on the western roof, whereas the utility generator is in the parking lot near the entrance to the south. The rest of the power distribution equipment is in the electrical room on the south side of the basement parking garage, including the generator, three transformers, seven additional panels, and disconnects for elevator control.

Grounding System

(Electrical Specifications 27 05 26 and E-5.1 Electrical Riser Diagram)

- Conductors: copper wire or cable insulated for at least 600V
- Bus: ¼" by 4" in cross section, Predrilled bars of annealed copper
- Bolted connection or exothermic-welded
- Grounding rods: copper-clad ¾" by 10'
- Bonding jumper between ground and neutral buses
- Ground all transformers, manholes and handholes
- Ground water service pipe and gas piping and metal air ducts and structural steel (grounding ring)

Emergency Power Systems

Article 700 and 701 of the NEC defines emergency power and requires loads such as exit signs, egress lighting, elevator lighting and controls, fire alarm systems, fire pumps, vital HVAC and fire suppression systems are required to be on a standby power system. There are more systems that need to be on standby power according to the NEC that are not present in Hyattsville Library. In the basement parking garage electrical room there is a 250 kW generator that supplies emergency power to the building. The generator is connected as a secondary source of power to three different automatic transfer switches, the primary power source being from the utility. ATS-ELV connects to the elevator motors keeping them operational in an emergency. ATS-LS controls power going to P-LS, which has emergency lighting loads and ATS-PE is connected to some lighting, some HVAC units, and a transformer that provides 120V power to receptacles and some office appliances. These receptacles and office appliances were chosen by the owner as optional standby and will still be operational during loss of power from the utility.

Electrical Depth 1 – Electric Vehicle Charging

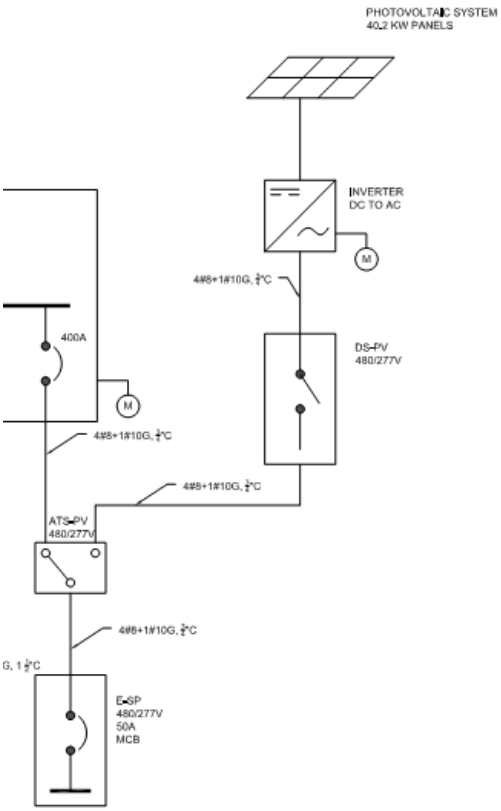
The electrical plans for the basement parking garage were completed by a different MEP company other than the primary. Because of this, there are some inconsistencies in the amount of detail given for panelboard schedules and plans. For example, panel PGB in the basement electric room had three existing electric vehicle charging stations in the schedule, but no indication of the company and model of the charger. In addition, it appeared as though the load was simply estimated on the schedule instead of being based on a real-world charger. To fix this oversight, I took it upon myself to find a new model of dual-tech electric vehicle charging that used less volt-amps than the previous chargers. Also, I decided to place five dual chargers in the parking garage, because out of one hundred parking spots, it is very possible that at least five visitors will use electric cars. In addition, the presence of more chargers will encourage more visitors and employees to drive their electric vehicles to the library, which is ultimately better for the environment. Due to the additional chargers the panelboard would need to be resized, however since the original loads for each of the three chargers required 13,000 VA and the new chargers only require about 9,000 VA, the panel and wire sizes are already sufficient to handle the slight overall increase in the load on panel PGB from 50,466 VA to 56,260 VA. Changing panel PGB, n turn increased the load on panel PGA which feeds PGB as well, but alike the previous panel, the increase in load was not enough to warrant a larger panel or thicker wires. The spots with the vehicle chargers will be located on the western side of the parking lot and are the closest spots to the stairs to the main floor except for the handicapped spaces to reward visitors for driving an electric vehicle.

TurboDock Dual
Wall Mount

https://www.evsolutions.com/upload/turbodock/TurboDock_Specsheet_042017.pdf

Electrical Depth 2 – Panel ESP

On the roof there is a 40.2 kW photovoltaic array that feed a panel, ESP, through an ATS switch which is also connected to the utility. Surprisingly, panel ESP had been originally left with only spare circuits, which means the solar panels are not powering anything. I decided that I wanted Panel ESP to be useful in order to take advantage of the inexhaustible source of energy that is the sun and lessen the load on the rest of the electrical system. Since there is no battery storage for the solar array, panel ESP will have to be powered by the utility during times when t is not sunny. Because of this, it is unacceptable to put any load on this panel that could be categorized as an emergency load or even optional standby. I decide to move four heaters to panel ESP, because they were quite big loads that where placed on panel PM-B1, one of the largest panels, with a 350 amp main circuit breaker. Some HVAC devices such as ventilation for the electrical rooms are already present on a standby system and will be powered by the basement generator during the event of power loss. I placed 27,354 VA of heaters on panel ESP that serves areas like toilets and stairs that are not necessary in the event of a power outage, but would be nice for the comfort of the visitor if they could be operational if the power is out during the day. In order to move the heaters from one panel to another, I had to find different devices, because panel ESP is 277/480 V, while the original panel PM-B1 was 120/208 V. Also, with the removal of loads from panel PM-B1, the panel PM-A was also had its load reduced since it feeds panel PM-B1.



Section of single-line diagram found in appendix B

Mechanical Breadth – Heater Replacement

By finding alternate devices for the mechanical system it is possible to reduce the demand loads, while keeping the same performance. Since I wanted to reduce the loads by as much as possible, I chose to find viable replacements for some of the heaters, because they have a very high demand per device. I decided to remove one AWH-A (QMARK AWH45083) and three UH-A (QMARK MUH-07-8) from panel PM-B1 which is 120/208 V. I decided to replace them with the 480 V equivalences EHA-AK9E and QMARK MUH-07-4 respectively, because with a higher voltage the demand in amps was less for these new devices. It was very important that the new heaters had the same BTUH as the original so that the performance of the mechanical system would not be affected. Device AWH45083 and EHA-AK9E both have 16400 BTUH and MUH-07-8 and MUH-07-4 have 25.6 BTUH. In order to power these new 480 V devices, the loads were placed and balanced on panel E-SP as part of my electrical depth and are powered by an ATS that is connected to both the photovoltaic array and utility MSB. Even though the load on panel PM-B1 went from 288 amps to 193 amps (a saving of 95 amps), the four new devices were able to fit on panel E-SP which only has a circuit breaker that can hold 50 amps. Only 33 amps were placed on this panel after the replacement, so I saved a total of 62 amps of load that will no longer be needed in the system.

http://www.reznorhvac.com/files/805e.pdf

Appendix A - Lighting Recommendations and Calculations

LPD Code Calculation

Ashrae 90.1 – Library = 1.3 W/ft^2

IECC 2015 – Library = 1.19W/ft^2

465 x 9W = 4,185W

4 x 53W = 212W

6 x 80W = 480W

8 x 108W = 864W

5 x 333W = 1,665W

24 x 46W = 1,104W

2 x 26W = 52W

11 x 8W = 88W

27 x 52W = 1,404W

53 x 39W = 2,067W

32 x 18W = 576W

7 x 9.8W = 68.6W

40 x 9W = 360W

5 x 104W = 520W

Total = 13,645.6W / 19,400ft^2 = 0.703W/ft^2

Entrance

Space	Illumination Recommendation	Illuminance Ratio	Illuminance Results	Ratio Results
Canopied / Medium activity / LZ2	10 lux Eh @0 ft AFF	3:1 Max:Avg 2:1 Avg:Min	11.3 lux	1.4:1 Avg:Min
	6 lux Ev @5 ft AFF	4:1 Avg:Min		
Non-covered / Medium activity / LZ2	10 lux Eh @0 ft AFF	3:1 Max:Avg 2:1 Avg:Min	10.4 lux	2.5:1 Avg:Min
	6 lux Ev @5 ft AFF	4:1 Avg:Min		

Children's Area

Space	Illumination Recommendation	Illuminance Ratio	Illuminance Results	Ratio Results
Book Stacks Shelving	300 lux Eh @2.5 ft AFF	2:1 Avg:Min	353.7 lux	3:1 Avg:Min
	100 lux Ev @1 ft AFF 200 lux Ev @2.5 ft AFF	4:1 Avg:Min	175.5 lux 289.5 lux	1.7:1 Avg:Min 1.3:1 Avg:Min
Reading Areas	500 lux Eh @2.5 ft AFF	2:1 Avg:Min	470.4 lux	1.5:1 Avg:Min
	200 lux Ev @4 ft AFF	-	220 lux	-
Children and Preschool Play Areas	200 lux Eh @0 ft AFF	2:1 Avg:Min	197.7 lux	2.2:1 Avg:Min
	50 lux Ev @4 ft AFF	-	54 lux	-
Computer Reading	150 lux Eh @2.5 ft AFF	2:1 Avg:Min	165.9 lux	2.1:1 Avg:Min
	50 lux Ev @3.5 ft AFF	2:1 Avg:Min	70 lux	1.6:1

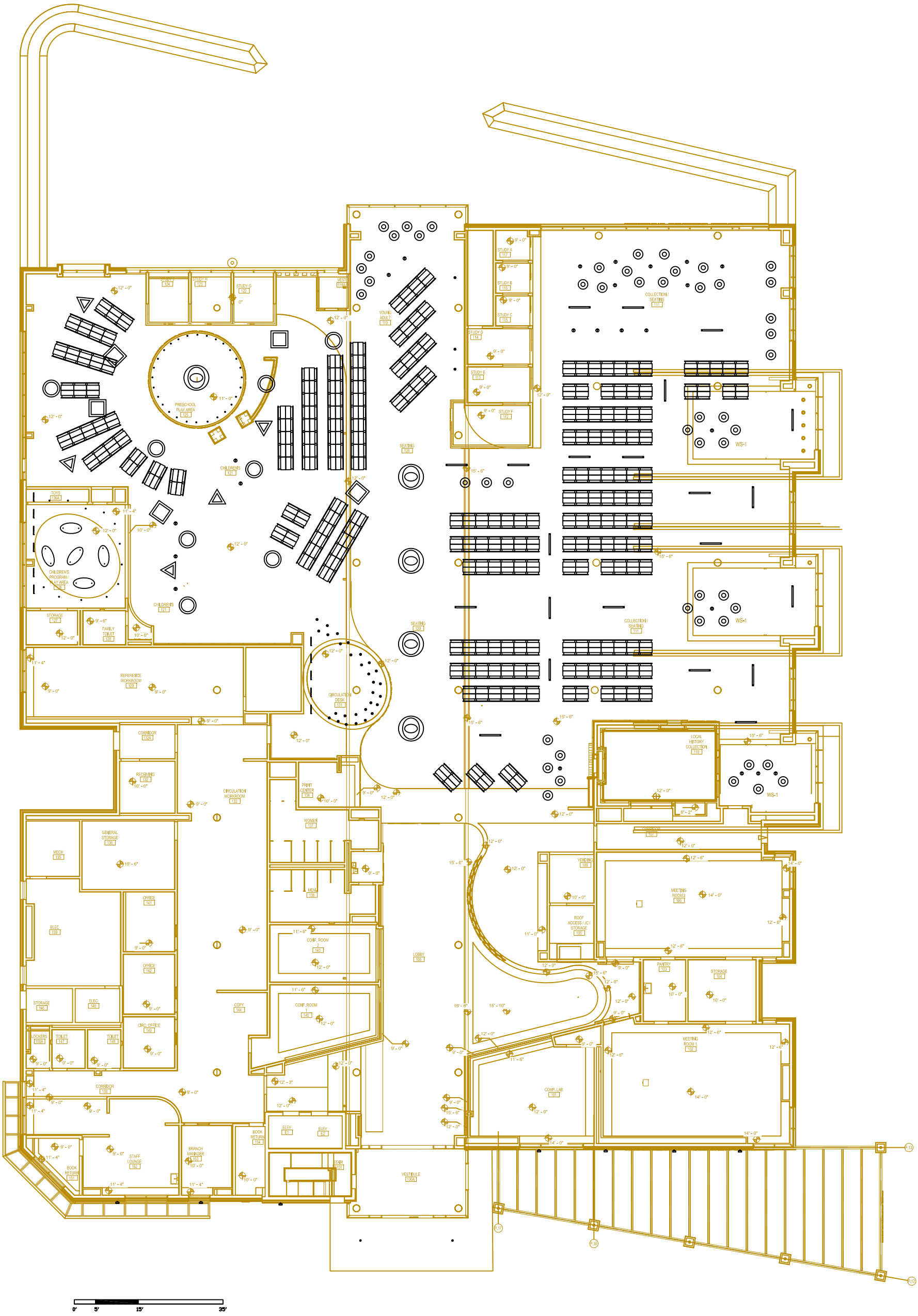
Young Adult's
Area / Circulation

Space	Illumination Recommendation	Illuminance Ratio	Illuminance Results	Ratio Results
Circulation Desk	500 lux Eh @2.5 ft AFF	2:1 Avg:Min	508.5 lux	1.6:1 Avg:Min
	200 lux Ev @5 ft AFF	-	212 lux	-
Library General	100 lux @0 ft AFF	2:1 Avg:Min	176.1 lux	1.9:1 Avg:Min
	30lux @5 ft AFF	-	40 lux	-
Book Stacks Shelving	300 lux Eh @2.5 ft AFF	2:1 Avg:Min	301 lux	3.3:1 Avg:Min
	100 lux Ev @1 ft AFF 200 lux Ev @2.5 ft AFF	4:1 Avg:Min	175.5 lux 289.5 lux	1.7:1 Avg:Min 1.3:1 Avg:Min
Reading Areas	500 lux Eh @2.5 ft AFF	2:1 Avg:Min	445.8 lux	1.6:1 Avg:Min
	200 lux Ev @4 ft AFF	-	210 lux	-
Computer Reading	150 lux Eh @2.5 ft AFF	2:1 Avg:Min	157 lux	2.1:1 Avg:Min
	50 lux Ev @3.5 ft AFF	2:1 Avg:Min	53 lux	1.6:1

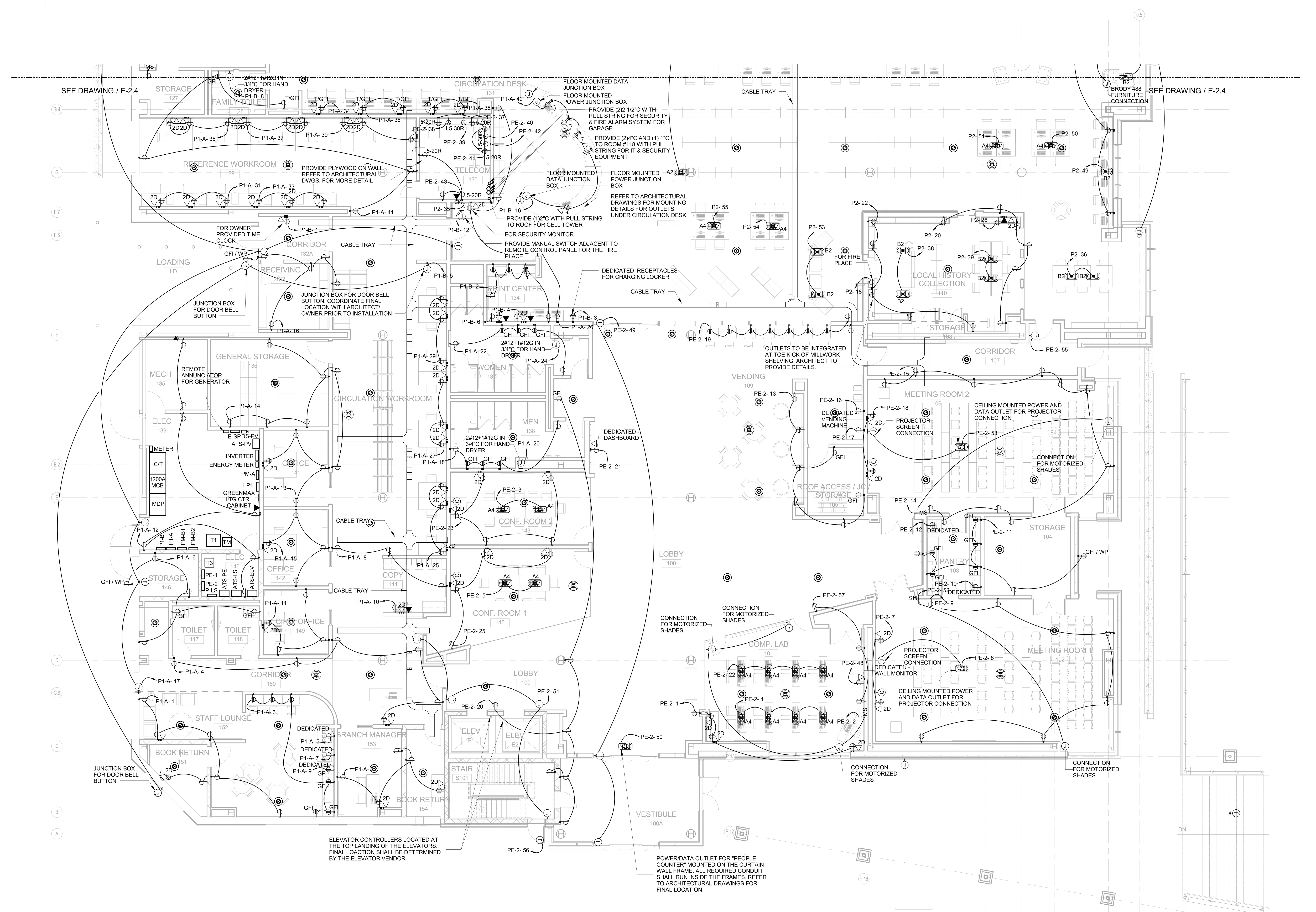
Main Collection / Seating Area

Space	Illumination Recommendation	Illuminance Ratio	Illuminance Results	Ratio Results
Book Stacks Shelving	300 lux Eh @2.5 ft AFF	2:1 Avg:Min	307.5 lux	2.3:1 Avg:Min
	100 lux Ev @1 ft AFF 200 lux Ev @2.5 ft AFF	4:1 Avg:Min	175.5 lux 289.5 lux	1.7:1 Avg:Min 1.3:1 Avg:Min
Reading Areas	500 lux Eh @2.5 ft AFF	2:1 Avg:Min	482.2 lux	1.7:1 Avg:Min
	200 lux Ev @4 ft AFF	-	lux	-
Computer Reading	150 lux Eh @2.5 ft AFF	2:1 Avg:Min	138 lux	2.4:1 Avg:Min
	50 lux Ev @3.5 ft AFF	2:1 Avg:Min	48 lux	2.1:1

Final Reflected Ceiling Plan

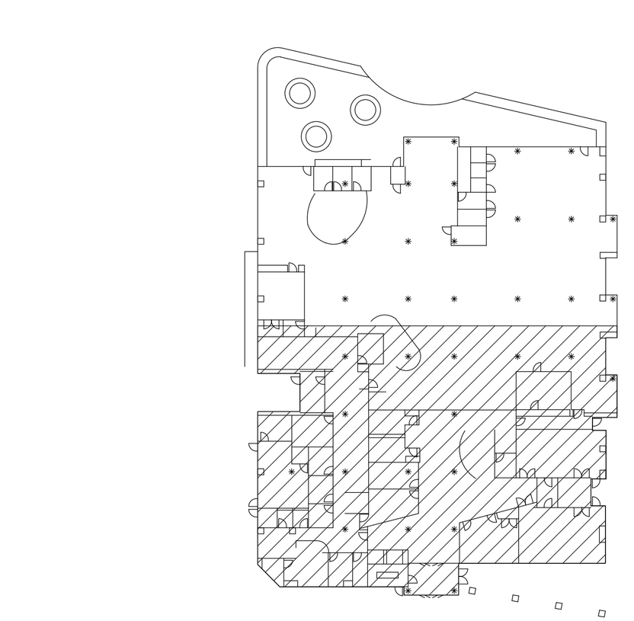


Appendix B – Single-line Diagram and Panelboard Schedules



1 E-2.3 Electrical - First Floor - Area A
1/8" = 1'-0"

NOTE:
1. PROVIDE PANIC HARDWARE ON DOORS FOR ELECTRICAL ROOM AS REQUIRED PER NEC.
2. FINAL LOCATION FOR THE IT ROOMS RACKS SHALL BE VERIFIED IN THE FIELD.



GRAPHIC SCALE
1/8" = 1'-0"

WEIGAND ASSOCIATES, INC.
MEP Consulting Engineers

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREAPREAD OR APPROVIDED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 17366, EXPIRATION DATE MAY 29TH, 2019

11720 Beltsville Drive
Suite 600
Calverton, MD 20705
Tel: 301.595.1000
www.grimmandparker.com

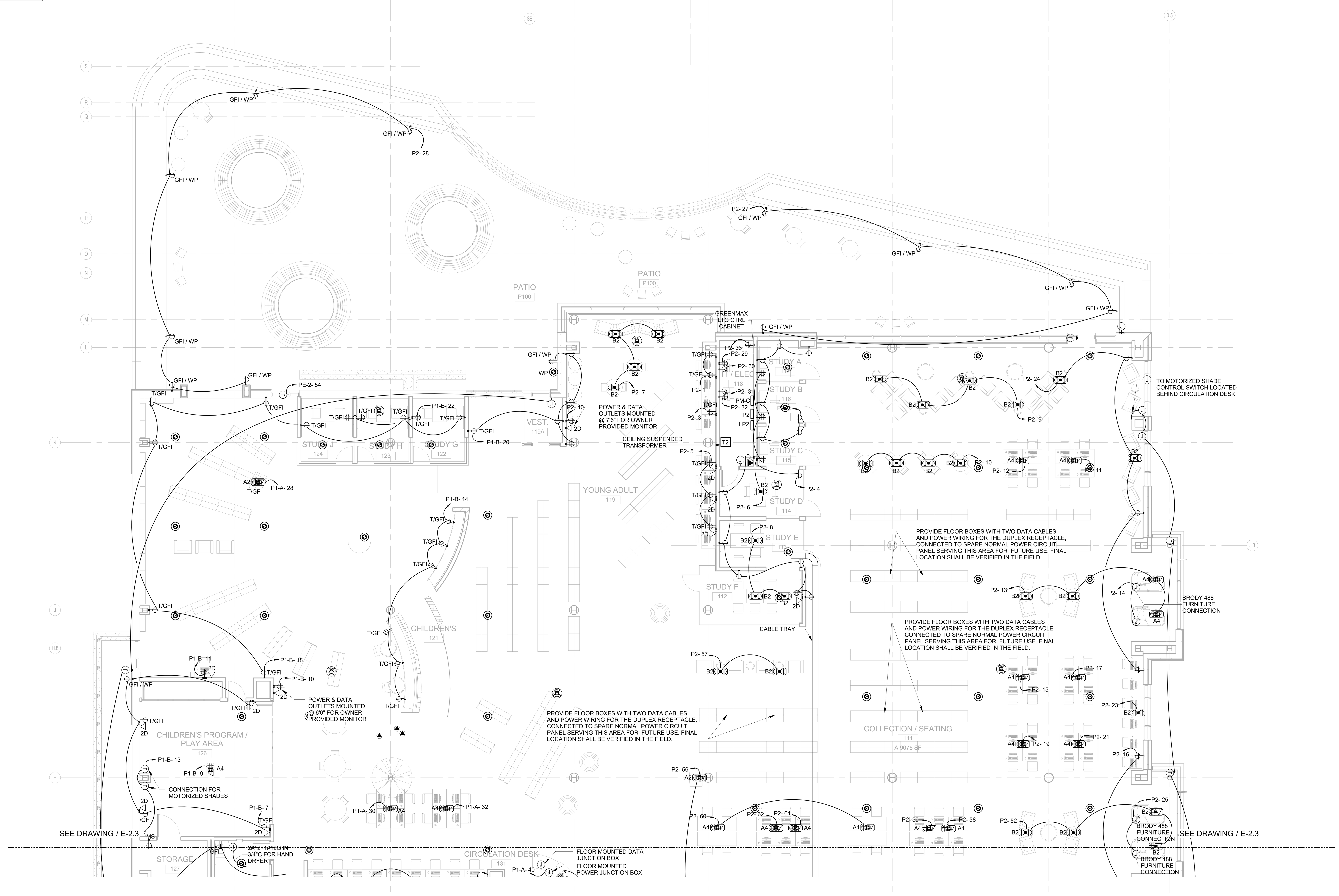
GRIMM AND PARKER

GP #21437

ELECTRICAL POWER FIRST FLOOR PLAN-AREA A
HYATTSVILLE BRANCH LIBRARY
6530 ADELPHI ROAD, HYATTSVILLE, MARYLAND 20782

DATE	DESCRIPTION

E-2.3
07.14.17
BID SET



Electrical - First Floor - Area B

1
E-2.4
1/8" = 1'-0"

NOTE:
1. FINAL LOCATION FOR THE IT ROOMS RACKS SHALL BE VERIFIED IN THE FIELD.

KEY PLAN

GRAPHIC SCALE
1/8" = 1'-0"

WEIGAND ASSOCIATES, INC.
MEP Consulting Engineers

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 17366, EXPIRATION DATE MAY 29TH, 2019

11720 Beltsville Drive
Suite 600
Calverton, MD 20705
Tel: 301.595.1000
www.grimmandparker.com

G+P
GRIMM AND PARKER

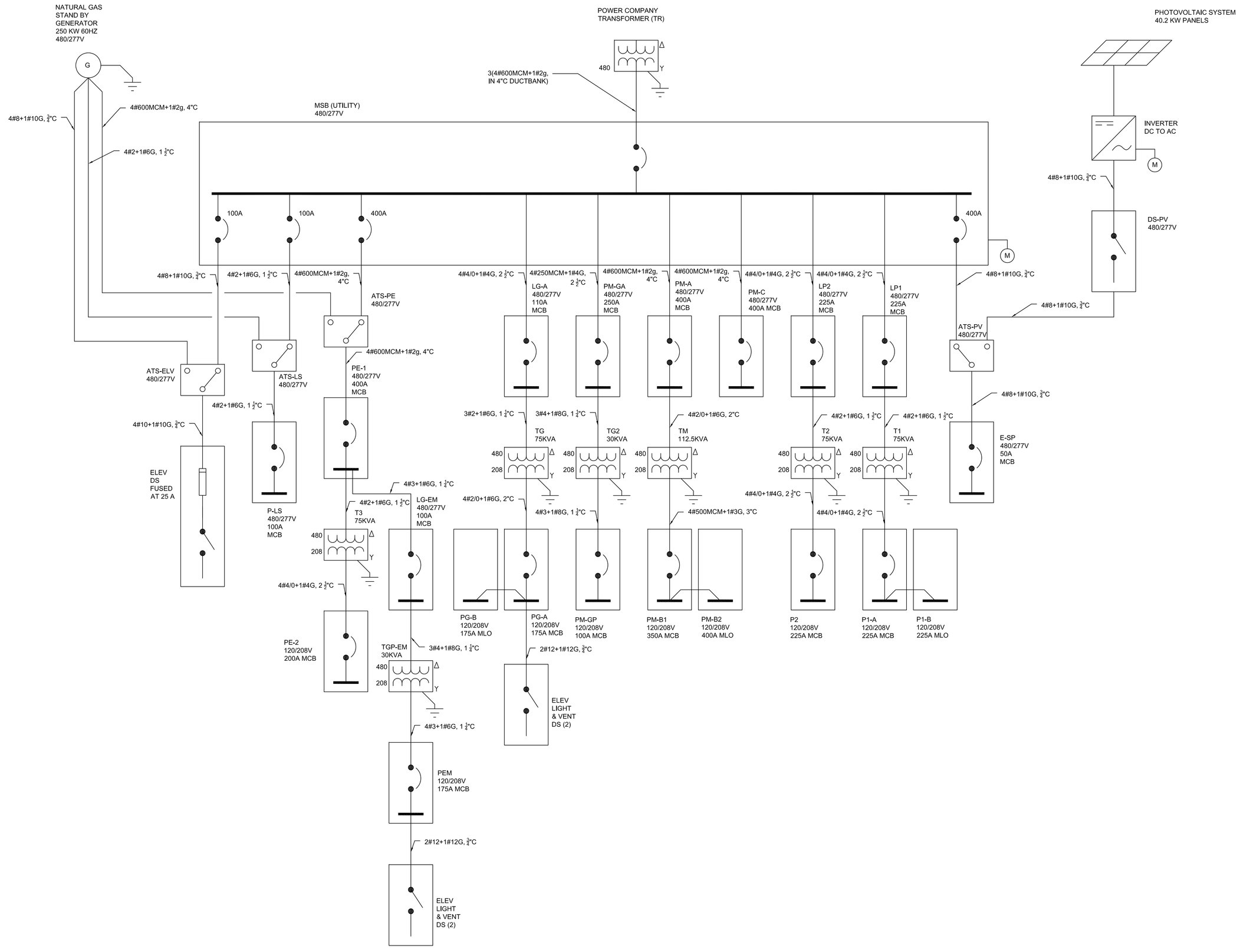
GP #21437

ELECTRICAL POWER FIRST FLOOR PLAN-AREA B

HYATTSVILLE BRANCH LIBRARY
6530 ADELPHI ROAD, HYATTSVILLE, MARYLAND 20782

DATE	DESCRIPTION

E-2.4
07.14.17
BID SET



SHEET NO.

E 5.0

SHEET: ELECTRICAL SINGLE LINE DIAGRAM	PROJECT: Hyattsville County Library	ADDRESS: 6530 Adelphi Rd., Hyattsville,MD
CREATED BY: Ari DiMaria	COURSE: AE 481	DATE: 10/15/2018

*ELECTRICAL SYSTEM DESIGNED BY WEIGAND ASSOCIATES (SEE E5.1 FOR RISER DIAGRAM)

New Panelboard Schedules

Branch Panel: PGB

Mains: 200A

175A MLO

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	Power	20A	1	180VA	600VA					1	15A	EF-8	2
3	Level 2 Automobile Charging Station	20A	2			3326VA	2494VA			1	15A	Level 1 Automobile Charging Station	4
5								3326VA	2494VA	1	15A	Level 1 Automobile Charging Station	6
7	Level 2 Automobile Charging Station	20A	2	3326VA	2494VA					1	15A	Level 1 Automobile Charging Station	8
9						3326VA	-			-	-	Spare	10
11	Level 2 Automobile Charging Station	20A	2					3326VA	2494VA	1	15A	Level 1 Automobile Charging Station	12
13				3326VA	3326VA					2	20A	Level 2 Automobile Charging Station	14
15	Level 2 Automobile Charging Station	20A	2			3326VA	3326VA						16
17								3326VA	-	-	-	Spare	18
19	Wall Heater AWA-H	20A	3	1600VA	1600VA					3	20A	Wall Heater AWA-H	20
21						1600VA	1600VA						22
23								1600VA	1600VA				24

25	Level 1 Automobile Charging Station	15A	1	2494VA									26
27													28
29													30
31													32
33													34
35													36
37													38
39													40
41													42
			Total Load:	18946VA		18998VA		18166VA					
			Total Amps:	158A		159A		152A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals
Heating	9600VA	100%	9600VA	
Motor	600VA	125%	750VA	
Power	45910VA	100%	45910VA	
			Total Connected Load:	56110VA
			Total Est. Demand:	56260VA
			Total Connected Amps:	156A
			Total Est. Demand Amps:	157A

Changes to Branch Panel PGA

Phase	A	B	C	
Total Load:	21446VA	20578VA	19706VA	
Total Amps:	179A	172A	165A	
Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals
Heating	9600VA	100%	9600VA	
Motor	600VA	125%	750VA	
Power	51170VA	100%	51170VA	
Receptacle	360VA	100%	360VA	
			Total Connected Load:	61730VA
			Total Est. Demand:	61880VA
			Total Connected Amps:	172A
			Total Est. Demand Amps:	172A

Changes to Branch Panel LG-A

Phase	A	B	C	
Total Load:	24446VA	22688VA	20395VA	
Total Amps:	88A	82A	74A	
Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals
Heating	9600VA	100%	9600VA	
Motor	600VA	125%	750VA	
Power	53670VA	100%	53670VA	
Receptacle	360VA	100%	360VA	
Lighting	3299VA	125%	4124VA	
			Total Connected Load:	67529VA
			Total Est. Demand:	68504VA
			Total Connected Amps:	81A
			Total Est. Demand Amps:	82A

E-SP

Mains: 100 Amp

50 Amp MCB

277/480 Volt

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	MUH074 Heater	15A	3	3118VA	6000VA					1	15A	EHA WOMEN ROOM 138	2
3						3118VA	6000VA			1	15A	EHA MEN 137	4
5								3118VA	6000VA	1	15A	EHA STAIR S101	6
7													8
9													10
11													12
13													14
15													16
17													18
19													20
21													22
23													24
25													26
27													28
29													30

31													32
33													34
35													36
37													38
39													40
41													42
		Total Load:		9118 VA		9118 VA		9118 VA					
		Total Amps:		33 A		33 A		33 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals
Heating	27354 VA	100%	27354 VA	
			Total Connected Load:	27354 VA
			Total Est. Demand:	27354 VA
			Total Connected Amps:	33A
			Total Est. Demand Amps:	33A

PM-B1

120/208 Volts

Mains: 400 A

MCB: 350A

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	EF-6	20A	1	635VA	360VA					1	20A	RECEPTACLE	2
3	EF-7	20A	1			635VA	540VA			1	20A	RECEPTACLE	4

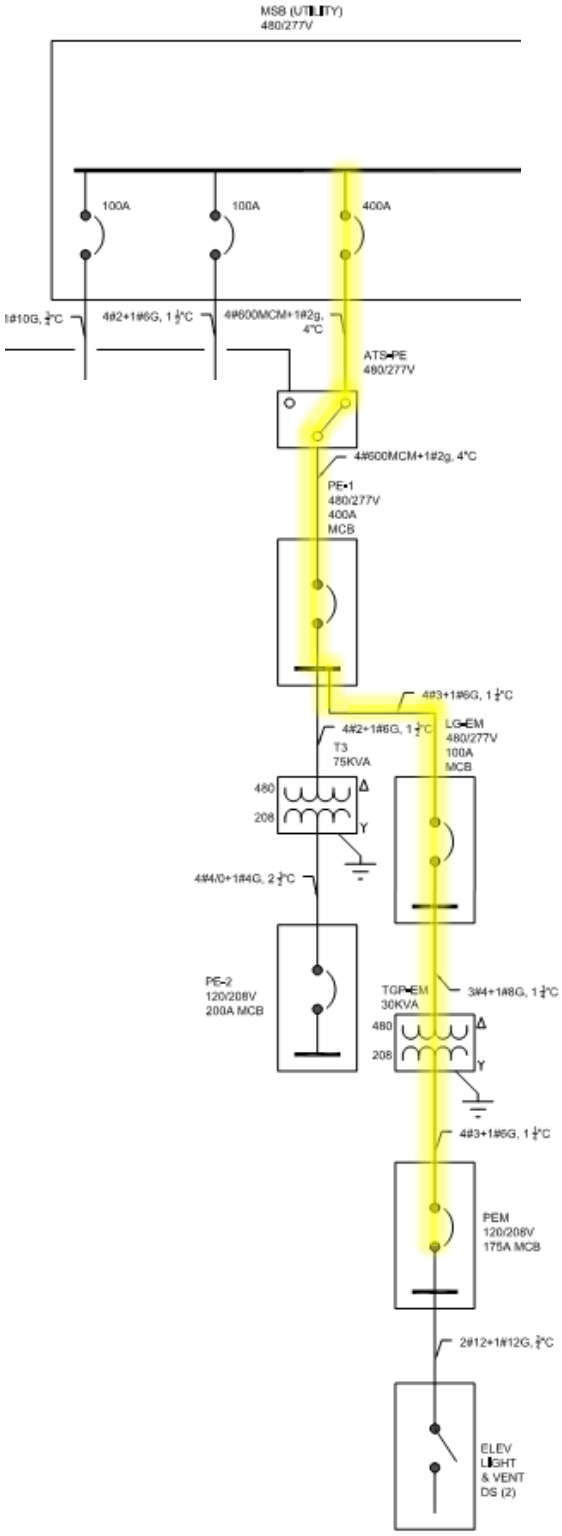
5	EF-9	20A	1					635VA	180VA	1	20A	RECEPTACLE	6
7	EF-10	20A	1	791VA	825VA					1	20A	WATER HEATER	8
9	ACH-A STUDY J 124	20A	1			900VA	825VA			1	20A	CIRCULATION PUMP	10
11	ACH-A STUDY G 122	20A	1					900VA	216VA	1	20A	WATER HEATER CONTROL CIRCUIT	12
13	SPARE	-	-	0	2028VA					2	20A	CU-B	14
15	SPARE	-	-			0	2028VA						16
17	AWH-A TOLIET 147	20A	3					2010VA	2010VA	3	20A	AWH-A	18
19				2010VA	2010VA								20
21						2010VA	2010VA						22
23	AWH-A TOLIET 148	20A	3					2010VA	2010VA	3	20A	AWH-A TOLIET 128	24
25				2010VA	2010VA								26
27						2010VA	2010VA						28
29	ACH-A STUDY H 123	20A	1					900VA	900VA	1	20A	ACH-A LIBRARY	30
31													32
33													34
35													36
37													38
39													40
41													42
Total Load:				12679VA		12968VA		11771VA					
Total Amps:				106A		108A		98A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals
Motor	216VA	125%	270VA	
Receptacle	1080VA	100%	1080VA	
Power	24312VA	100%	24312VA	
Office Appliances	43706VA	100%	43706VA	
			Total Connected Load:	69314VA
			Total Est. Demand:	69368VA
			Total Connected Amps:	193A
			Total Est. Demand Amps:	193A

Changes to Branch Panel PM-A

Phase	A	B	C	
Total Load:	41150VA	39569VA	38372VA	
Total Amps:	149A	143A	139A	
Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals
Mechanical Equipment	49774VA	100%	49774VA	
Motor	216VA	125%	270VA	
Power	24312VA	100%	24312VA	
Receptacle	1080VA	100%	1080VA	
Office Appliances	43706VA	100%	43706VA	
			Total Connected Load:	119091VA
			Total Est. Demand:	119149VA
			Total Connected Amps:	143A
			Total Est. Demand Amps:	143A

Voltage Drop



Assumptions / Constants

- Copper wires with magnetic conduit
- 0.9 power factor
- 0.577 multiplier for three-phase, line to neutral

MSB>ATS-PE

- 277/480 V
- 226 A
- 600 kcmil
- 62.5 ft

$$VD = \frac{(0.71)(0.577)(62.5)(226)}{10000} = 0.579 \text{ V}$$

$$VD\% = \frac{0.579}{480} \times 100\% = 0.12\%$$

ATS-PE>PE-1

- 277/480 V
- 226 A
- 600 kcmil
- 15.5 ft

$$VD = \frac{(0.71)(0.577)(15.5)(226)}{10000} = 0.144 \text{ V}$$

$$VD\% = \frac{0.114}{480} \times 100\% = 0.03\%$$

PE-1>LG-EM

- 277/480 V
- 33 A
- 3 AWG
- 72 ft

$$VD = \frac{(4.4)(0.577)(72)(226)}{10000} = 0.603 \text{ V}$$

$$VD\% = \frac{0.603}{480} \times 100\% = 0.13\%$$

LG-EM>TGP-EM

- 277/480 V
- 64 A
- 4 AWG
- 3 ft

$$VD = \frac{(5.3)(0.577)(3)(64)}{10000} = 0.059 \text{ V}$$

$$VD\% = \frac{0.059}{480} \times 100\% = 0.01\%$$

TG-EM>PEM

- 120/208 V
- 64 A
- 3 AWG
- 3 ft

$$VD = \frac{(4.4)(0.577)(3)(64)}{10000} = 0.049 \text{ V}$$

$$VD\% = \frac{0.049}{480} \times 100\% = 0.01\%$$

$VD_{total} = 1.434$ V

$VD\%_{total} = 0.3\% < 5\%$ Code

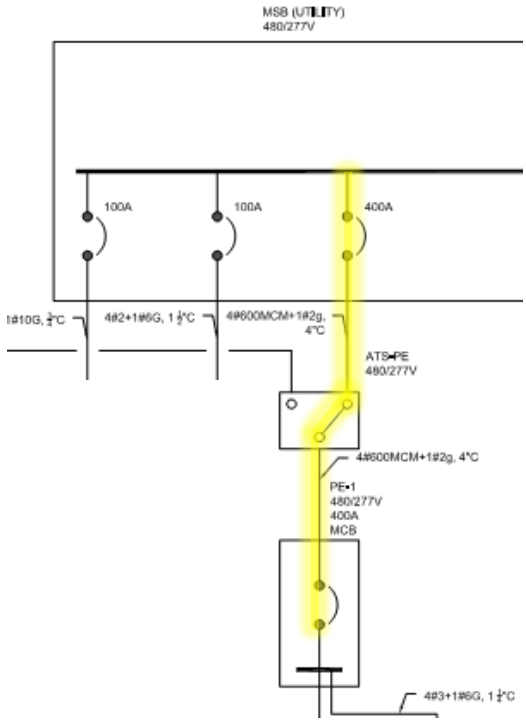
Table 3-12—Three-phase line-to-line voltage drop for 600 V single-conductor cable per 10 000 A-ft (60 °C conductor temperature, 60 Hz)

Load power factor lagging	Wire size (AWG or kcmil)																						
	1000	900	800	750	700	600	500	400	350	300	250	4/0	3/0	2/0	1/0	1	2	4	6	8*	10*	12*	14*
Section 1: Copper conductors in magnetic conduit																							
1.00	0.28	0.31	0.34	0.35	0.37	0.42	0.50	0.60	0.68	0.78	0.92	1.1	1.4	1.7	2.1	2.6	3.4	5.3	8.4	13	21	33	53
0.95	0.50	0.52	0.55	0.57	0.59	0.64	0.71	0.81	0.88	1.0	1.1	1.3	1.5	1.9	2.3	2.8	3.5	5.3	8.2	13	20	32	50
0.90	0.57	0.59	0.62	0.64	0.66	0.71	0.78	0.88	0.95	1.1	1.2	1.3	1.6	1.9	2.3	2.8	3.4	5.2	8.0	12	19	30	48
0.80	0.66	0.68	0.71	0.73	0.74	0.80	0.85	0.95	1.0	1.1	1.2	1.4	1.6	1.9	2.3	2.6	3.2	4.8	7.3	11	17	27	43
0.70	0.71	0.73	0.76	0.78	0.80	0.83	0.88	0.97	1.0	1.1	1.2	1.3	1.5	1.8	2.1	2.5	3.0	4.4	6.6	9.9	15	24	38
Section 2: Copper conductors in nonmagnetic conduit																							
1.00	0.23	0.26	0.28	0.29	0.33	0.38	0.45	0.55	0.62	0.73	0.88	1.0	1.3	1.6	2.1	2.6	3.3	5.3	8.4	13	21	33	53
0.95	0.40	0.43	0.45	0.47	0.50	0.54	0.62	0.71	0.80	0.92	1.0	1.1	1.5	1.8	2.2	2.7	3.4	5.3	8.2	13	20	32	50
0.90	0.47	0.48	0.52	0.54	0.55	0.59	0.68	0.76	0.85	0.95	1.1	1.1	1.5	1.8	2.2	2.7	3.3	5.1	7.9	12	19	30	48
0.80	0.54	0.55	0.57	0.59	0.62	0.66	0.73	0.81	0.88	0.97	1.1	1.1	1.4	1.7	2.1	2.5	3.1	4.7	7.2	11	17	27	43
0.70	0.57	0.59	0.62	0.64	0.66	0.69	0.74	0.83	0.88	0.97	1.1	1.1	1.4	1.6	2.0	2.4	2.8	4.3	6.4	9.7	15	24	38
Section 3: Aluminum conductors in magnetic conduit																							
1.00	0.42	0.45	0.49	0.52	0.55	0.63	0.74	0.91	1.0	1.2	1.4	1.7	2.1	2.6	3.3	4.2	5.2	8.4	13	21	33	52	–
0.95	0.62	0.65	0.70	0.73	0.76	0.83	0.94	1.1	1.2	1.4	1.6	1.8	2.3	2.7	3.4	4.2	5.3	8.2	13	20	32	50	–
0.90	0.69	0.72	0.76	0.79	0.82	0.88	0.99	1.2	1.3	1.4	1.6	1.9	2.3	2.7	3.4	4.1	5.1	7.9	12	19	30	48	–
0.80	0.76	0.80	0.83	0.85	0.88	0.95	1.0	1.2	1.3	1.4	1.6	1.8	2.2	2.6	3.2	3.9	4.7	7.3	11	17	27	43	–
0.70	0.80	0.83	0.87	0.89	0.92	0.98	1.1	1.2	1.3	1.4	1.6	1.7	2.1	2.4	2.9	3.6	4.3	6.5	10	15	24	37	–
Section 4: Aluminum conductors in nonmagnetic conduit																							
1.00	0.36	0.39	0.44	0.47	0.51	0.59	0.70	0.88	1.0	1.2	1.4	1.7	2.1	2.6	3.3	4.2	5.2	8.4	13	21	33	52	–
0.95	0.52	0.56	0.60	0.63	0.67	0.74	0.85	1.0	1.1	1.3	1.5	1.8	2.2	2.7	3.4	4.2	5.2	8.2	13	20	32	50	–
0.90	0.57	0.61	0.65	0.68	0.71	0.79	0.89	1.1	1.2	1.3	1.5	1.8	2.2	2.6	3.3	4.1	5.0	7.9	12	19	30	48	–
0.80	0.63	0.66	0.71	0.73	0.76	0.83	0.92	1.1	1.2	1.3	1.5	1.7	2.1	2.5	3.1	3.8	4.6	7.2	11	17	27	42	–
0.70	0.66	0.69	0.73	0.75	0.78	0.83	0.92	1.1	1.1	1.3	1.4	1.6	1.7	2.3	2.8	3.4	4.2	6.4	9.9	15	24	37	–

*Solid conductor. Other conductors are stranded.

To convert voltage drop to	Multiply by
Single-phase, three-wire, line-to-line	1.15
Single-phase, three-wire, line-to-neutral	0.577
Three-phase, line-to-neutral	0.577

Short Circuit Analysis



Assumptions / Constants

- 10000 base kVA
- Utility transformer
    - Short circuit rating = 100000 kVA
    - Size = 750 kVA
    - Voltage 277/480 V

1.

$PUX_{utility} = \frac{10000}{100000} = 0.1$

$PUX_{tans} = \frac{(3.4425)(10000)}{(100)(750)} = 0.459$

$PUR_{tans} = \frac{(0.6317)(10000)}{(100)(750)} = 0.084$

$PUX_{wire} = \frac{3(0.00405)(10000)}{(100)(0.48)^2} = 5.271$

$PUR_{wire} = \frac{3(0.00222)(10000)}{(100)(0.48)^2} = 2.886$

$PUZ_{total1} = ((0.084+2.886)^2+(0.1+0.459+5.271)^2)^{1/2} = 6.543$

$I_{sc} = \frac{10000}{(3)^{1/2}(.48)(6.543)} = 1838 \text{ A}$

$I_{motor} = \frac{10000(4)}{(3)^{1/2}(480)} = 276 \text{ A}$

$I_{total\ sc1} = 1838 + 276 = 2114 \text{ A}$

$X/R_{ratio1} = \frac{5.83}{2.97} = 1.96$

2.

$PUX_{wire} = \frac{(0.00229)(10000)}{(100)(0.48)^2} = 0.995$

$PUR_{wire} = \frac{(0.00125)(10000)}{(100)(0.48)^2} = 0.544$

$PUX_{breaker} = \frac{(0.00039)(10000)}{(100)(0.48)^2} = 0.169$

$PUR_{breaker} = \frac{(0.00031)(10000)}{(100)(0.48)^2} = 0.135$

$PUZ_{total2} = ((2.97+0.544+0.135)^2+(5.83+0.995+0.169)^2)^{1/2} = 7.889$

$I_{sc} = \frac{10000}{(3)^{1/2}(.48)(7.889)} = 1525 \text{ A}$

$I_{motor} = \frac{26151(4)}{(3)^{1/2}(480)} = 31 \text{ A}$

$I_{total\ sc2} = 1525 + 31 = 1556 \text{ A}$

$X/R_{ratio2} = \frac{6.994}{3.649} = 1.917$

3.

$$PUX_{wire} = \frac{(0.00057)(10000)}{(100)(0.48)^2} = 0.249$$

$$PUR_{wire} = \frac{(0.00031)(10000)}{(100)(0.48)^2} = 0.136$$

$$PUX_{breaker} = \frac{(0.00039)(10000)}{(100)(0.48)^2} = 0.169$$

$$PUR_{breaker} = \frac{(0.00031)(10000)}{(100)(0.48)^2} = 0.135$$

$$PUZ_{total3} = ((3.649+0.136+0.135)^2+(6.994+0.249+0.169)^2)^{1/2} = 8.385$$

$$I_{sc} = \frac{10000}{(3)^{1/2}(.48)(8.385)} = 1434 \text{ A}$$

$$I_{motor} = \frac{26151(4)}{(3)^{1/2}(480)} = 31 \text{ A}$$

$$I_{total\ sc3} = 1434 + 31 = 1465 \text{ A}$$

$$X/R_{ratio3} = \frac{7.412}{3.92} = 1.891$$

Appendix C - Device Schedules and Cutsheets

Electrical Devices

Tag	Type	Level Where Installed	Room Number Where Installed	Associated Floor Plan Sheet
TR	Utility Transformer	First Level	Outside	E-5.5
T1	Transformer	First Level	MAIN ELECRTICAL ROOM	E-2.3
T2	Transformer	First Level	IT/ELEC ROOM #118	E-2.4
T3	Transformer	First Level	2-HR FIRE RATED CLOSET	E-2.3
TG	Transformer	Garage Level	GARAGE ELEC. ROOM	E-3.1
TG2	Transformer	Garage Level	GARAGE ELEC. ROOM	E-3.1
TM	Transformer	First Level	MAIN ELECRTICAL ROOM	E-2.3
TP-EM	Transformer	Garage Level	GARAGE ELEC. ROOM	E-3.1
MSB (UTILITY)	Main Switch Board	First Level	MAIN ELECRTICAL ROOM	E-2.3
ATS-PV	Automatic Transfer Switch	First Level	MAIN ELECRTICAL ROOM	E-2.3
ATS-LS	Automatic Transfer Switch	First Level	2-HR FIRE RATED CLOSET	E-2.3
ATS-ELV	Automatic Transfer Switch	First Level	2-HR FIRE RATED CLOSET	E-2.3
ATS-PE	Automatic Transfer Switch	First Level	2-HR FIRE RATED CLOSET	E-2.3
G	Generator	Garage Level	GARAGE ELEC. ROOM	E-3.1
DS-PV	Disconnect Switch	First Level	MAIN ELECRTICAL ROOM	E-2.3

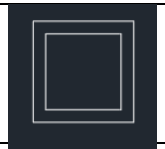
DS	Disconnect Switch	Garage Level	ELEVATOR MACHINE ROOM	E-3.1
INVERT.	Inverter	First Level	MAIN ELECRTICAL ROOM	E-2.3
E-SP	Distribution Panel	First Level	MAIN ELECRTICAL ROOM	E-2.3
PM-A	Distribution Panel	First Level	MAIN ELECRTICAL ROOM	E-2.3
PM-B1	Distribution Panel	First Level	MAIN ELECRTICAL ROOM	E-2.3
PM-B2	Distribution Panel	First Level	MAIN ELECRTICAL ROOM	E-2.3
LP1	Distribution Panel	First Level	MAIN ELECRTICAL ROOM	E-2.3
P1-A	Distribution Panel	First Level	MAIN ELECRTICAL ROOM	E-2.3
P1-B	Distribution Panel	First Level	MAIN ELECRTICAL ROOM	E-2.3
PE-1	Distribution Panel	First Level	2-HR FIRE RATED CLOSET	E-2.3
PE-2	Distribution Panel	First Level	2-HR FIRE RATED CLOSET	E-2.3
P-LS	Distribution Panel	First Level	2-HR FIRE RATED CLOSET	E-2.3
PM-C	Distribution Panel	First Level	IT/ELEC ROOM #118	E-2.4
LP2	Distribution Panel	First Level	IT/ELEC ROOM #118	E-2.4
P2	Distribution Panel	First Level	IT/ELEC ROOM #118	E-2.4
PM-GA	Distribution Panel	Garage Level	GARAGE ELEC. ROOM	E-3.1
PM-GP	Distribution Panel	Garage Level	GARAGE ELEC. ROOM	E-3.1

LG-EM	Distribution Panel	Garage Level	GARAGE ELEC. ROOM	E-3.1
PEM	Distribution Panel	Garage Level	GARAGE ELEC. ROOM	E-3.1
LG-A	Distribution Panel	Garage Level	GARAGE ELEC. ROOM	E-3.1
PG-A	Distribution Panel	Garage Level	GARAGE ELEC. ROOM	E-3.1
PG-B	Distribution Panel	Garage Level	GARAGE ELEC. ROOM	E-3.1

Transformers

Tag	Primary Voltage	Secondary Voltage	Size (kVA)	Type	Temperature Rise	Mounting
T1	480/277	208/120	75	Dry	150	Pad
T2	480/277	208/120	75	Dry	150	Pad
T3	480/277	208/120	75	Dry	150	Pad
TG	480/277	208/120	75	Dry	150	Pad
TG2	480/277	208/120	30	Dry	150	Pad
TM	480/277	208/120	112.5	Dry	150	Pad
TR		480/277		Dry		Pad
TP-EM	480/277	208/120	30	Dry	150	Pad

Luminaire Schedule

Symbol	Count	Name	Description	Manufacturer	Catalog No.	Voltage	Watts	CCT	CRI	Lumens	Mounting
	465	Stack 117	3’ long Stack Luminaire	Vode	117WGK13ZZST18IPAE2ZLO30D1WH0	120-277	9	3000 K	80	855	Stack Mounted
	5	Micro Quad II	4’ direct/indirect square pendant	Betacalco	983935WD148D30N30S1Z1PR2	120-277	53	3000 K	80	6392	Pendant
	5	Micro Triangle II	4’ direct/indirect triangle pendant	Betacalco	984130D30N30S1Z1PR2	120-277	80	3000 K	80	9965	Pendant
	8	Micro Ring II	4’ direct/indirect ring pendant	Betacalco	953120D30N30S1Z1PR2SS	120-277	108	3000 K	80	8640	Pendant
	5	Bubble 3D	110” diameter multi-ring pendant	Betacalco	BCBT501LP30	120-277	333	3000 K	80	22036	Pendant
	24	Micro Straight	4’ long linear direct/indirect pendant	Betacalco	AC2J2K2U1D2F1L1E0C0W0	120-277	46	3000 K	80	4571	Pendant
	2	REUL CL	Exterior downlight	Betacalco	23203230GRDB	120-277	26	3000 K	80	1962	Surface
	11	Lumen Façade Nano Interior	4’ wall grazer	Lumenpulse	LOGNI4W4830K30X30FRWAMN2WHUCTLUL	48	4W/ft	3000 K	80	884	Grazer
	27	Choose Table Halo	Table lamp	Artemide	1128020A	120-277	52	2821 K	80	820	Table
	53	Ring of Fire	27” diameter ring pendant	RZB	311570004730	277	39	3000 K	80	3800	Pendant
	32	Luca Pendant	4.75” diameter cylinder pendant	Bruck	113862chINecosv	120	18	3000 K	90	1000	Pendant

	7	Framed	exterior sconce	Betacalco	13000030DBMBMB	277	9.8	3114 K	80	760	Wall
	40	Mina Pendant	5” orb pendant	Tech Lighting	700TDMINAP11CWBLED930	120	9	3000 K	90	135	Pendant

New ~~Pggroject~~

Type: ~~fdg~~

Project City:

Created By:

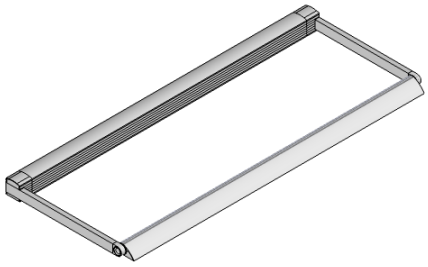
Company:

Notes:

Specification Code:

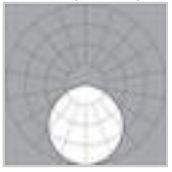
117-WG-K1-3-ZZ-ST-18-IP-AE-2-Z-SO-30-D1-WH-0

Step Number:	Code:	Description:
1. System Code	117	Stack | 117
2. Rail Type	WG	WingRail
3. Single/Double Rail	K1	Single-sided
4. Overall System Length	3	3' length (914mm)
5. Rail Length	ZZ	Other rail length or layout (please specify) 6"
6. Mounting	ST	Stack
7. Arm Length	18	18" arm (457mm)
8. Power Location	IP	Integral Power
9. Power Supply	AE	eldoLED 0-10v, 1% Dimming
10. Voltage	2	120v - 277v
11. LED Type	Z	Zipper board
12. Lumen Output	SO	Standard Output
13. Color Temperature	30	3000K, 80+ CRI
14. Optics	D1	Diffuse
15. Finish	WH	White Painted
16. Options	0	None



Stack | 117, Single-sided WingRail, with 18" arm (457mm) and Stack mounted

WingRail
Asymmetric profile, 1.14? (29mm) x 2.12? (54mm).


Arm Length: Arm lengths of single and double-sided MLR Sidekick Systems are measured from the center of the ballast housing to the end of the arm.

Dimming: Dimming curve is factory preset to linear. Logarithmic is available upon request.

ETL listed, dry location

For more information visit:
Resources & Downloads - https://vode.com/resources-downloads

MICRO QUAD WOOD II

WEB PIN 166

GENERAL SPECIFICATION

Body: Aluminum.
Canopy: White powder coated.
Finish: Powder coated.
Suspension: Stainless steel cables.
Power cable: Silver braided.
Drivers: HPF electronic drivers for 120-277V (EU-240V), 0-10V, 1% dimming.
Remote Mounting Of Drivers: Wire size 18 AWG - max distance (from fixture to drivers) 40', wire size 16 AWG - max distance 60', wire size 14 AWG - max distance 90'. Drivers must be accessible after installation.
Mechanical: Luminaires mount directly over J box (by others - North America only).
Diffusers: Frosted acrylic.
L70 @25deg C: > 50,000 hrs.
Delivered Lumens: Delivered lumens & LPW based on 3000K (min 80 CRI) for White LEDs only.
Approvals: Damp Location (Indoor use only).

MICRO QUAD WOOD II

WEB PIN 166

HOW TO ORDER

A SPECIFY LUMINARIE LENGTH

Code:	Length:	Power (LED):	Light Direction:	Delivered lms (Length):	LPW:
98 3815	610mm/24"	13W	Direct	1572	119
98 3825	915mm/36"	20W	Direct	2356	118
98 3835	1219mm/48"	27W	Direct	3142	118
98 3845	1524mm/60"	33W	Direct	3928	118
98 3855	1803mm/71"	40W	Direct	4714	118
98 3865	2108mm/83"	47W	Direct	5498	118
98 3915	610mm/24"	27W	Direct/Indirect	3196	120
98 3925	915mm/36"	40W	Direct/Indirect	4794	120
98 3935	1219mm/48"	53W	Direct/Indirect	6392	120
98 3945	1524mm/60"	66W	Direct/Indirect	7990	120
98 3955	1804mm/71"	80W	Direct/Indirect	9588	120
98 3965	2108mm/83"	93W	Direct/Indirect	11186	120

Additional Information

Calculate total lumens and wattage by adding the Length lumens to the Width lumens. For example: direct only 36" length x 48" width = 2356 + 3142 = 5498 total lumens.

B SPECIFY WIDTH

Code:	Width:	Power (LED):	Light Direction:	Delivered lms (Width):	LPW:
WD24	610mm/24"	13W	Direct	1572	119
WD36	915mm/36"	20W	Direct	2356	118
WD48	1219mm/48"	27W	Direct	3142	118
WD60	1524mm/60"	33W	Direct	3928	118
WD71	1834mm/71"	40W	Direct	4714	118
WD83	2108mm/83"	47W	Direct	5498	118
WDI24	610mm/24"	27W	Direct/Indirect	3196	120
WDI36	915mm/36"	40W	Direct/Indirect	4794	120
WDI48	1219mm/48"	53W	Direct/Indirect	6392	120
WDI60	1524mm/60"	66W	Direct/Indirect	7990	120
WDI71	1804mm/71"	80W	Direct/Indirect	9558	120
WDI83	2108mm/83"	93W	Direct/Indirect	11186	120

C SPECIFY CCT/COLOR (DIRECT)

D30	3000K (*min 80CRI*)
D35	3500K (*min 80CRI*)
D40	4000K (*min 80CRI*)
DRD	Red
DGN	Green
DBL	Blue

D SPECIFY CCT/COLOR (INDIRECT)

N30	3000K (*min 80 CRI*)
N35	3500K (*min 80 CRI*)
N40	4000K (*min 80 CRI*)
NRD	Red
NGN	Green
NBL	Blue

E SPECIFY SUSPENSION

S1	Vertical, Remote Driver
S3	Vertical, Integral Driver

F SPECIFY FINISH

Z1	Wood Grain - Light Cherry
Z2	Wood Grain - Dark Walnut

G SPECIFY LUMEN & WATTAGE REDUCTION

PR1	Lumen & Wattage Reduction to approximately 50% of standard Output
PR2	Lumen & Wattage Reduction to approximately 75% of standard Output

Additional Information

PR1 is on available with 983815. Custom reduction percentages available upon request.

EXAMPLE SPECIFICATION CODE	983815/W71/D30/N30/S1/Z1

betacalco.com

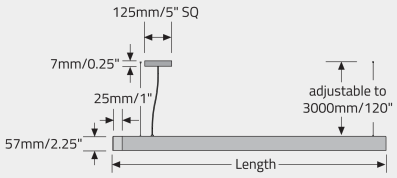
+1 416-531-9942 | sales@betacalco.com

MICRO QUAD WOOD II

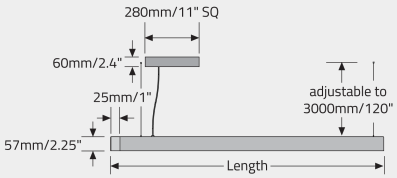
WEB PIN 166

DIMENSIONAL DIAGRAMS

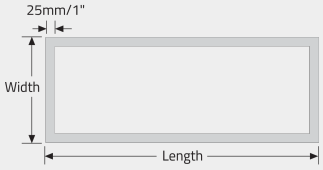
S1 - VERTICAL, REMOTE DRIVER



S3 - VERTICAL, INTEGRAL DRIVER



Direct/Indirect: Available upto 1168mm/46" sq only.

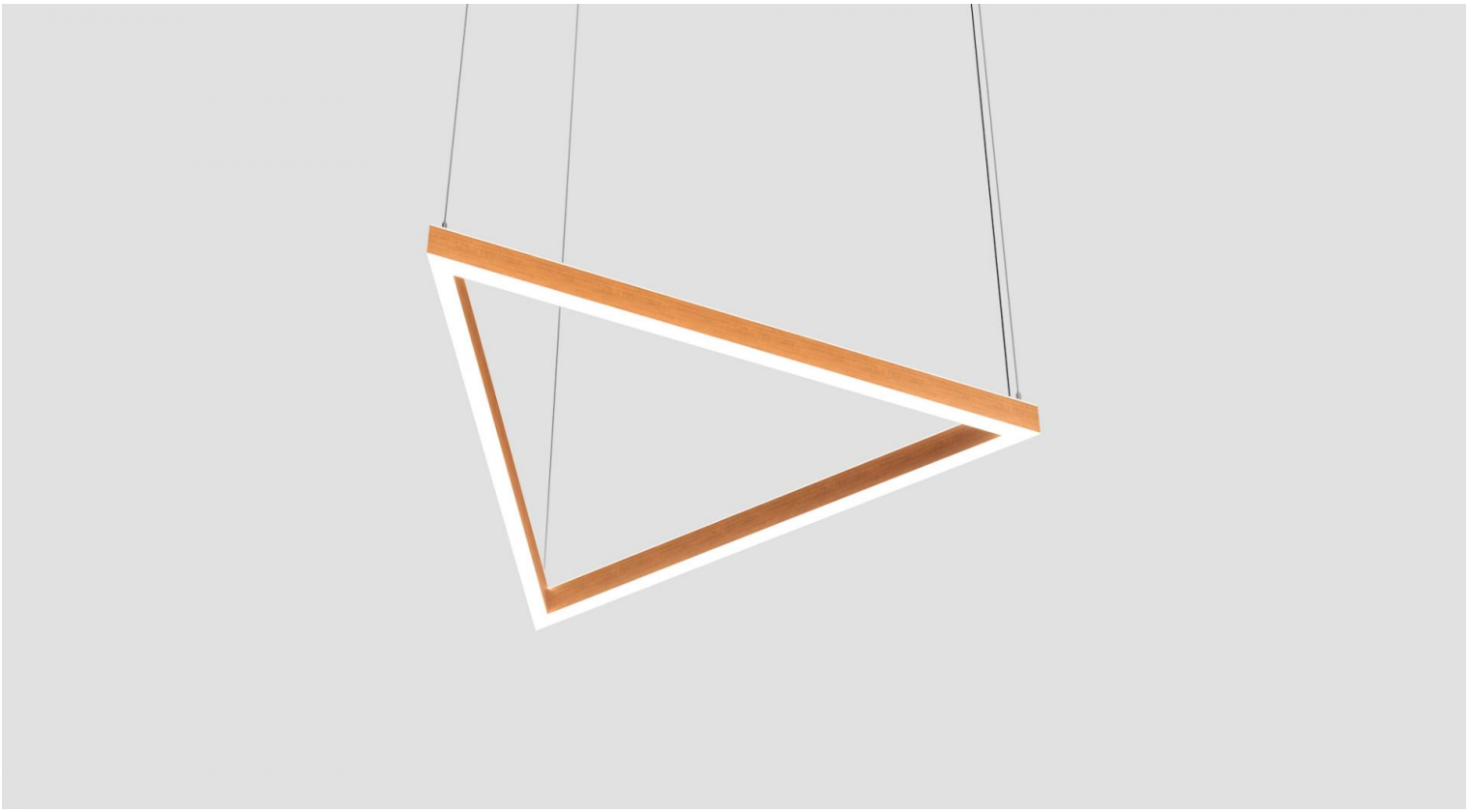


APPROVALS

CE DAMP LOCATION Intertek F IP20

MICRO TRIANGLE II

WEB PIN 191



GENERAL SPECIFICATION

Product Overview:

- Sleek 1" (25mm) profile
- Robust aluminium construction
- High efficiency frosted acrylic diffuser with 123 LPW delivered
- Available in five sizes, three different colour temperatures and multiple finishes including our signature Light Cherry & Dark Walnut wood grain.
- Larger sizes and multi-tier pendants available for custom order.

Body: Aluminum, Equilateral Triangle
Finish: Powder coated for standard finishes (black, metallic silver & white). For wood grain finishes the canopy will be white.
Suspension: Stainless steel cables.
Power cable: Silver braided.
Drivers: HPF electronic drivers for 120-277V (EU-240V), 0-10V, 1% dimming.
Remote Mounting Of Drivers: Wire size 18 AWG - max distance (from fixture to drivers) 40', wire size 16 AWG - max distance 60', wire size 14 AWG - max distance 90'. Drivers must be accessible after installation.
Mechanical: Luminaires mount directly over J box (by others - North America only).
Diffusers: Frosted acrylic.
L70 @25deg C: > 50,000 hrs.
Delivered Lumens: Delivered lumens & LPW based on 3000K (min 80 CRI) for White LEDs only.
Approvals: Damp Location (Indoor use only).

MICRO TRIANGLE II

WEB PIN 191

HOW TO ORDER

A SPECIFY LUMINAIRE

Code:	Length:	Power (LED):	Light Direction:	Delivered lms:	LPW:
98 4010	610mm/24"	20W	Direct	2464	123
98 4020	915mm/36"	30W	Direct	3700	123
98 4030	1219mm/48"	40W	Direct	4932	123
98 4040	1524mm/60"	50W	Direct	6165	123
98 4050	1829mm/72"	60W	Direct	7400	123
98 4110	610mm/24"	40W	Direct/Indirect	4997	125
98 4120	915mm/36"	60W	Direct/Indirect	7492	125
98 4130	1219mm/48"	80W	Direct/Indirect	9965	125
98 4140	1524mm/60"	100W	Direct/Indirect	12482	125
98 4150	1829mm/72"	120W	Direct/Indirect	14985	125

B SPECIFY CCT/COLOR (DIRECT)

D30	3000K (*min 80 CRI*)
D35	3500K (*min 80 CRI*)
D40	4000K (*min 80 CRI*)
DRD	Red
DGN	Green
DBL	Blue

C SPECIFY CCT/COLOR (INDIRECT)

N30	3000K (*min 80 CRI*)
N35	3500K (*min 80 CRI*)
N40	4000K (*min 80 CRI*)
NRD	Red
NGN	Green
NBL	Blue

D SPECIFY SUSPENSION

S1	Vertical, Remote Driver
S2	Hub, Remote Driver (*1219mm/48" max*)
S3	Vertical, Integral Driver
S4	Hub, Integral Driver (*1219mm/48" max*)
S6	Power Over Aircraft Cable, Vertical, Remote Driver (*max 60W*), 72" Max

Additional Information

S6 Option available in North America only.

E SPECIFY FINISH

BL	Black
MS	Metallic Silver
WH	White
Z1	Wood Grain - Light Cherry
Z2	Wood Grain - Dark Walnut

Additional Information

Note: The canopy will be white for fixtures with the wood grain finishes Z1 or Z2

F SPECIFY LUMEN & WATTAGE REDUCTION

PR0	Lumen & Wattage Reduction to approximately 25% of standard output
PR1	Lumen & Wattage Reduction to approximately 50% of standard Output
PR2	Lumen & Wattage Reduction to approximately 75% of standard output

Additional Information

PR0 not available for 984010. Note: Custom reduction percentages available upon request.

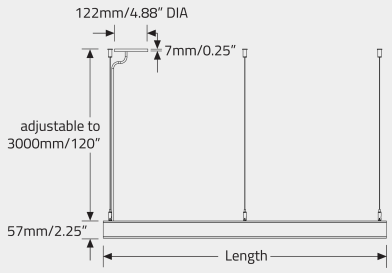
EXAMPLE SPECIFICATION CODE	984005/D35/N35/S1/BL

MICRO TRIANGLE II

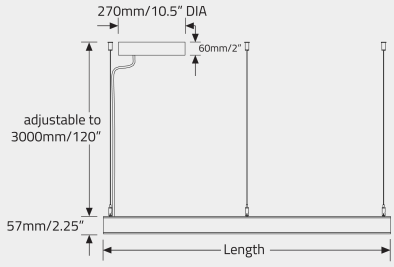
WEB PIN 191

DIMENSIONAL DIAGRAMS

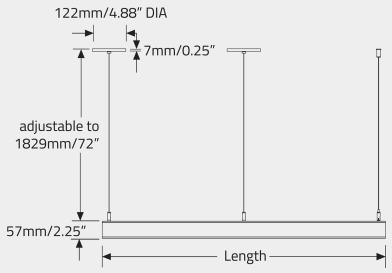
S1 VERTICAL - REMOTE DRIVER



S3 VERTICAL - INTEGRAL DRIVER

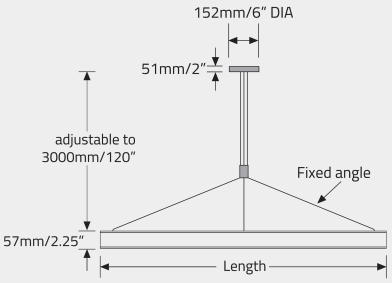


S6 VERTICAL - REMOTE DRIVER



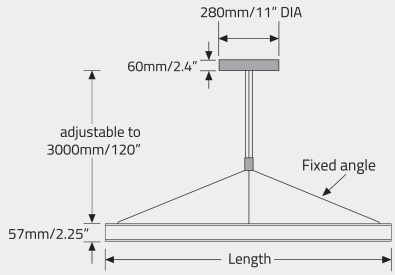
Power Over Aircraft Cable

S2 HUB - REMOTE DRIVER

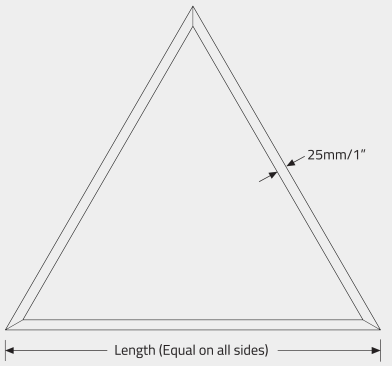


Direct: Available up to 1219mm/48" DIA only.
Direct/Indirect: Available up to 1219mm/48" DIA only.

S4 HUB - INTEGRAL DRIVER



Direct: Available up to 1219mm/48" DIA only.
Direct/Indirect: Available up to 1219mm/48" DIA only.



APPROVALS

DAMP LOCATION

Intertek

IP20

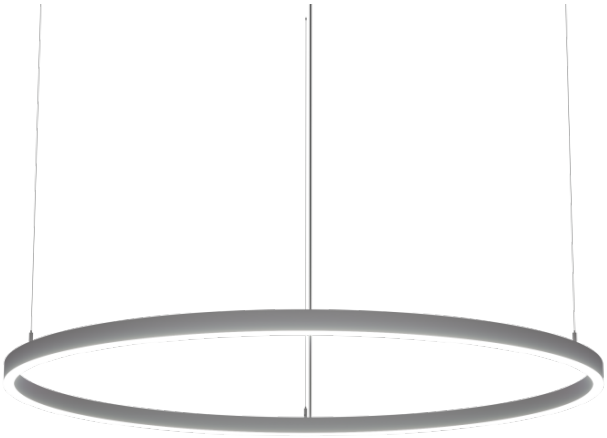
MICRO RING II

WEB PIN 181

MICRO RING II

WEB PIN 181

GENERAL SPECIFICATION

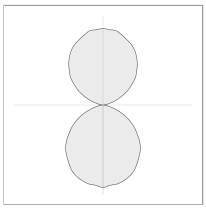


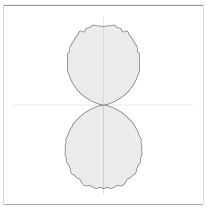
Body: Aluminum.
Finish: Powder coated for standard finishes (black, metallic silver & white). For wood grain finishes, the canopy will be white.
Suspension: Stainless steel cables.
Power cable: Silver braided.
Diffuser: Protruding Lens (2.1mm/0.08")
Drivers: HPF electronic drivers for 120-277V (EU-240V), 0-10V, 1% dimming.
Remote Mounting Of Drivers: Wire size 18 AWG - max distance (from fixture to drivers) 40', wire size 16 AWG - max distance 60', wire size 14 AWG - max distance 90'. Drivers must be accessible after installation.
Remote Emergency: Emergency option provides a 1.5 hour (3 hours for EU) emergency lighting facility. The remote system includes the inverter module, NiCad batteries and a remote wall/ceiling LED charge indicator and test switch (NA only) Maximum distance between wall/ceiling plate and luminaire is 4.5m/15'. Test switch fits a single gang box (not supplied).
Mechanical: Luminaires mount directly over J box (by others - North America only).
L70 @25deg C: > 50,000 hrs.
Delivered Lumens: Delivered lumens & LPW based on 3000K (min 80 CRI) for White LEDs only.
Approvals: Damp Location (Indoor use only).

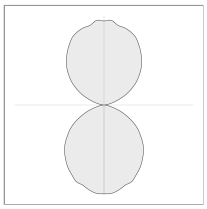
MOUNTING & OPTICS

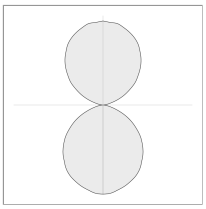

Suspended Direct

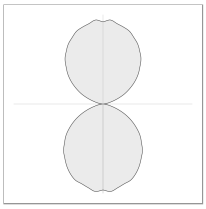

Suspended Direct/Indirect

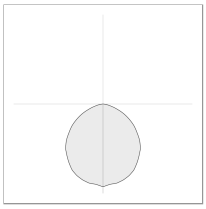

95 3110

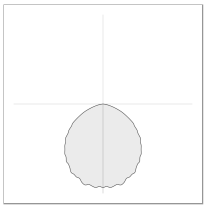

95 3120

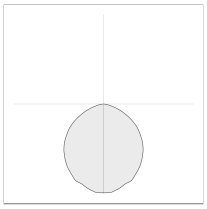

95 3130

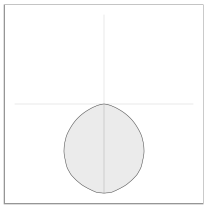

95 3140

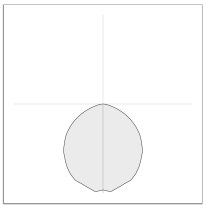

95 3150


95 3010


95 3020


95 3030


95 3040


95 3050

MICRO RING II

WEB PIN 181

HOW TO ORDER

A SPECIFY LUMINAIRE

Code:	Diameter (A):	Light Direction:	Power (LED):	Delivered lms:	LPW:	# of Sections:	Suspension Points:
95 3010	914mm/36"	Direct	39W	3081	79	1	3
95 3020	1219mm/48"	Direct	50W	3950	79	1	3
95 3030	1524mm/60"	Direct	68W	5360	79	1	3
95 3040	1829mm/72"	Direct	80W	6320	79	1	4
95 3050	2134mm/84"	Direct	95W	7504	79	1	4
95 3110	914mm/36"	Direct/Indirect	80W	6400	80	1	3
95 3120	1219mm/48"	Direct/Indirect	108W	8640	80	1	3
95 3130	1524mm/60"	Direct/Indirect	135W	10811	80	1	3
95 3140	1829mm/72"	Direct/Indirect	160W	12800	80	1	4
95 3150	2134mm/84"	Direct/Indirect	190W	15166	80	1	4

B SPECIFY CCT/COLOR (DIRECT)

D30	3000K (*min 80 CRI*)
D35	3500K (*min 80 CRI*)
D40	4000K (*min 80 CRI*)
DRD	Red
DGN	Green
DBL	Blue

C SPECIFY CCT/COLOR (INDIRECT)

N30	3000K (*min 80 CRI*)
N35	3500K (*min 80 CRI*)
N40	4000K (*min 80 CRI*)
NRD	Red
NGN	Green
NBL	Blue

D SPECIFY SUSPENSION

S1	Vertical, Remote Driver
S2	Hub, Remote Driver
S3	Vertical, Integral Driver
S4	Hub, Integral Driver

Additional Information

Direct Only light distribution not available with S2 or S4 suspension for size 1829mm/72" and larger

Direct/Indirect light distribution not available with S2, S3 or S4 suspension for size 1829mm/72" and larger

E SPECIFY FINISH

BL	Black
MS	Metallic Silver
WH	White
Z1	Wood Grain - Light Cherry (*914mm/36" to 1829mm/72" only*)
Z2	Wood Grain - Dark Walnut (*914mm/36" to 1829mm/72" only*)

Additional Information

Note: *Canopies for wood grain finishes Z1 & Z2 will be white, and the wood grain finishes are not available for 2134mm/84" diameter.*

F SPECIFY LUMEN & WATTAGE REDUCTION

PR0	Lumen & Wattage Reduction to approximately 25% of standard output
PR1	Lumen & Wattage Reduction to approximately 50% of standard output
PR2	Lumen & Wattage Reduction to approximately 75% of standard output

Additional Information

Note: Custom Reduction Percentages Available Upon Request.

G SPECIFY OPTIONS

RE	Remote Emergency System
SS	Separate switching

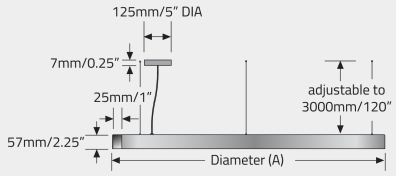
EXAMPLE SPECIFICATION CODE	953110/35/D35/NGN/S1/WH

MICRO RING II

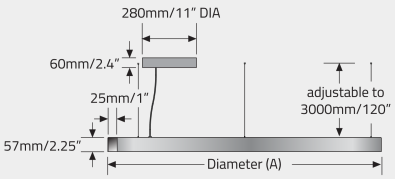
WEB PIN 181

DIMENSIONAL DIAGRAMS

S1 VERTICAL - REMOTE DRIVER

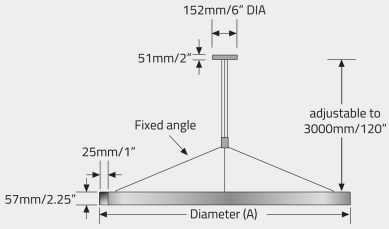


S3 VERTICAL - INTEGRAL DRIVER



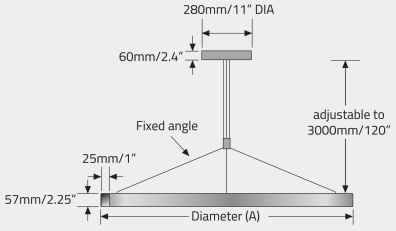
Direct/Indirect: Available up to 1219mm/48" DIA only.

S2 HUB - REMOTE DRIVER



Direct: Available up to 1219mm/48" DIA only.
Direct/Indirect: Available up to 1219mm/48" DIA only.

S4 HUB - INTEGRAL DRIVER



Direct: Available up to 1219mm/48" DIA only.
Direct/Indirect: Available up to 1219mm/48" DIA only.

APPROVALS

DAMP LOCATION

Intertek

IP20

BUBBLE 3D

WEB PIN 117

BUBBLE 3D

WEB PIN 117

GENERAL SPECIFICATION

Housing: Round metal frame consisting of modules combined together for electrical and mechanical connection. Bubble 3D supplied in the following diameters: 1000mm (39.4"), 1800mm (70.9") and 2800mm (110.0").

Diffusers: Injection molded, UV stabilized, opal polycarbonate. Diffusers are sectional with subtle but visible seams. Bubble 1000, 3 diffusers; Bubble 1800, 8 diffusers and Bubble 2800, 16 diffusers.

Drivers: Luminaires supplied with two power supply box included electronic drivers 120/277V, dim 0-10V (10%). Connection of the power cords (approx 6) to the remote drivers by others.

Power cables: Luminaires, supplied with 13.5m/35' of cable. Cables can be extended to a maximum overall distance of 20m/64'. *Custom cable lengths can be supplied to special order.*

Finish: White RAL 9003.

Delivered Lumens: Delivered lumens & LPW based on 3000K (min 80 CRI).

Note: *Luminaire composed of 1 x Bubble 2800, 1 x Bubble 1800 and 1 x Bubble 1000 with suspended cables and canopy. Positions fixed as per drawing (see Dimensional Diagrams). Triple Circuit.*

MOUNTING & OPTICS

Suspended 3 sides

BUBBLE 3D

WEB PIN 117

HOW TO ORDER

A SPECIFY LUMINAIRE

Code:	Type:	Power (LED):	Delivered lms:	Weight:
BCBT500P	Adjustable	564W+333W+173W	70753	130kg/286.6lb
BCBT501LP	Low Profile	564W+333W+173W	70753	130kg/286.6lb

B SPECIFY CCT

30	3000K (*min 80 CRI*)
35	3500K (*min 80 CRI*)
40	4000K (*min 80 CRI*)

C SPECIFY ACCESSORIES

150A031VE Umbrella tool for assembly/installation of Bubble (*required only for 2800mm/110" dia.*). Retains structural integrity during the installation process

Additional Information

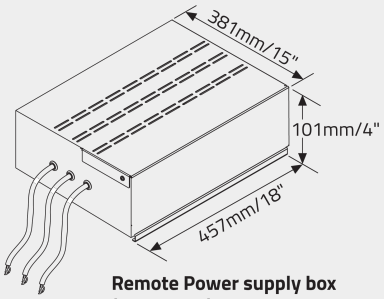
1. One required per order

EXAMPLE SPECIFICATION CODE	BCBT500P/35

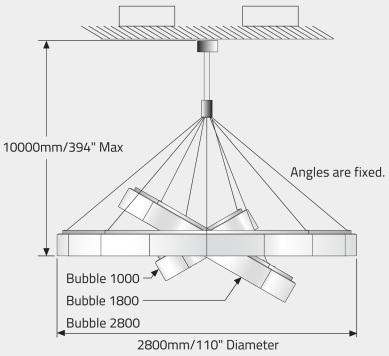
BUBBLE 3D

WEB PIN 117

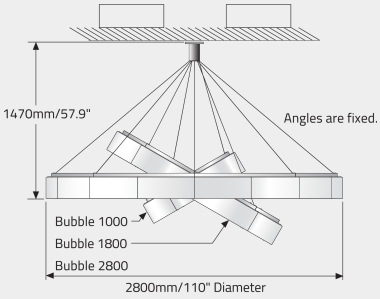
DIMENSIONAL DIAGRAMS



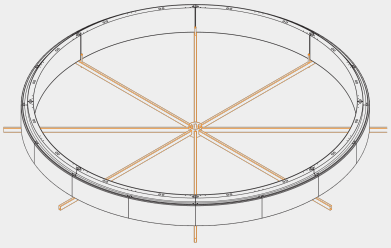
Remote Power supply box (2 required)



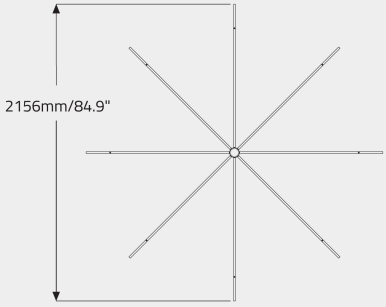
Adjustable pendant option



Low Profile Pendant option



Umbrella tool for assembly



150A031VE UMBRELLA

APPROVALS

MACRO STRAIGHT

WEB PIN 250

GENERAL SPECIFICATION

Body and trim: Steel and aluminum.
Finish: Polyester powder coated. Canopy finishes as specified except for wood grain finishes where the canopy will be supplied white.
Suspension: Stainless steel cables. Recommended minimum distance from ceiling: 305mm/12" for white LEDs and 610mm/24" for colored LEDs (only for direct/indirect).
Power cable: Silver braided.
Diffusers: Opal polycarbonate, supplied in sections.
Drivers: Integral, HPF electronic drivers for 120-277V (EU-240V).
Mechanical: Luminaires mount directly over J box (by others - North America only).
Integral emergency system: Emergency option provides a 1.5 hour (3 hours for EU) emergency lighting facility. The self contained system includes the inverter module, NiCad batteries, LED charge indicator and test switch (NA only). Integral emergency EU luminaires have a 270mm/10.5" DIA x 48mm/2" height canopy with LED charge indicator. Not available with a 347V supply.
L70 @25°C (77°F): > 60,000 hrs.
Delivered lumens: Delivered lumens & LPW based on 4000K (min 80 CRI) for white LEDs only.
Approvals: Damp Location (Indoor use only).

MACRO STRAIGHT

WEB PIN 250

HOW TO ORDER

A SPECIFY LUMINAIRE

Code:	Straight:	Version:	Wattage:	Delivered lms:	LPW:
AC1	914mm/36"	Direct	35W	3430	99
AC2	1219mm/48"	Direct	46W	4571	99
AC3	1524mm/60"	Direct	54W	5353	99
AC4	1828mm/72"	Direct	69W	6883	99
AC5	2134mm/84"	Direct	81W	8028	99
AC6	2438mm/96"	Direct	92W	9102	99
AC7	914mm/36"	Direct/Indirect	49W	4914	101
AC8	1219mm/48"	Direct/Indirect	64W	6461	101
AC9	1524mm/60"	Direct/Indirect	76W	7696	101
AC10	1829mm/72"	Direct/Indirect	97W	9853	102
AC11	2134mm/84"	Direct/Indirect	113W	11492	102
AC12	2438mm/96"	Direct/Indirect	129W	13029	101

Additional Information

Direct lms/ft = 1143, Direct/Indiect lms/ft = 1638

Custom lengths available, consult factory.

B SPECIFY CCT/COLOR (DIRECT)

J2	3000K (*min 80 CRI*)
J3	3500K (*min 80 CRI*)
J4	4000K (*min 80 CRI*)
J7	Red
J8	Green
J9	Blue

C SPECIFY CCT/COLOR (INDIRECT)

K0	Indirect CCT/Color not required
K2	3000K (*min 80 CRI*)
K3	3500K (*min 80 CRI*)
K4	4000K (*min 80 CRI*)
K7	Red
K8	Green
K9	Blue

D SPECIFY UPLIGHT DIFFUSER

U0	Uplight diffuser not required
U1	Clear diffuser
U2	Opal diffuser (*10% reduction on indirect lumens*)

Additional Information

To be selected for Direct/Indirect fixtures only

E SPECIFY DIMMING

D1	0-10V Dimming (*1.0%*)
D2	0-10V Dimming (*0.1%*)
D3	347V, 0-10V Dimming (*1.0%*)
D4	DALI Dimming (*0.1%*)
D5	DALI Dimming (*1.0%*)
D6	DSI (*EU only*)
D7	dimSwitch (*EU only*)

Additional Information

D6 & D7 options not available in North America

F SPECIFY FINISH

F1	White
F2	Black
F20	Metallic Silver
F27	Wood grain - Light Cherry
F28	Wood grain - Dark Walnut

G SPECIFY LUMEN OUTPUT

L0	100% of standard output
L1	Lumen & wattage reduction to approximately 75% of standard output
L2	Lumen & wattage reduction to approximately 50% of standard output
L3	Lumen & wattage reduction to approximately 25% of standard output

Additional Information

To be selected for Direct/Indirec fixtures only

H SPECIFY EMERGENCY

E0	Emergency system not required
E1	Emergency system - integral (*direct illumination only, not available with 347V*)

I SPECIFY CONTROLS

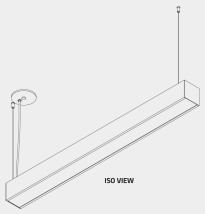
C0	Controls not required
C1	Encelium/Zigbee control

J SPECIFY SWITCHING

W0	Single circuit
W1	Separate switching (*two power cables supplied*)

EXAMPLE SPECIFICATION CODE	AC4/J3/K8/U1/D2/F2/L0/E0/C0/W1

DIMENSIONAL DIAGRAMS



APPROVALS

DAMP LOCATION

Intertek

F

IP20

Configured Specification Sheet

lumenfacade nano

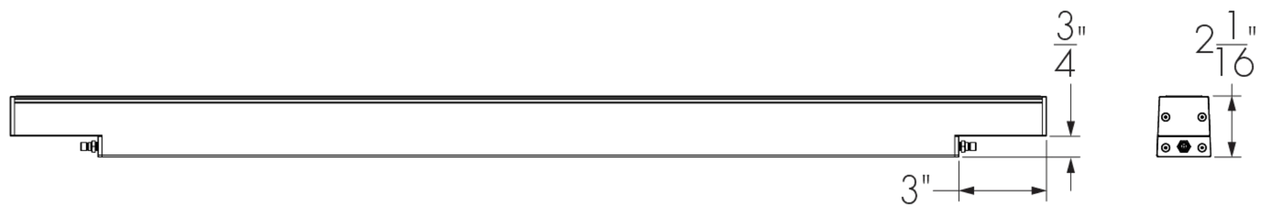
Interior
LOGNI

WHITE AND STATIC COLORS

Project Name _____ **Qty** _____

Type _____ **Catalog / Part Number** LOGNI 4W 48V 48 30K 30x30 FR WAMN2 WH UCTL UL

Top view



Front and side views

Photometric Summary

4ft, 4 W/ft, 4000K	Delivered output (lm)	Intensity (peak cd)
8°x8°	1,530	41,352
10°x10°	1,456	32,262
10°x30°	1,435	9,126
10°x60°	1,427	4,867
10°x90°	1,424	2,551
30°x10°	1,439	9,098
30°x30°	1,767	4,079
30°x60°	1,713	2,581
30°x90°	1,726	1,865
60°x10°	1,426	5,647
60°x60°	1,730	1,279
60°x90°	1,719	1,540
90°x90°	1,690	1,045
W (120°)	864	N/A
WW	1,524	7,393

Photometric performance is measured in compliance with IESNA LM 79-08.

Optics

Description

The Lumenfacade Nano Interior is a high-efficiency linear LED luminaire that goes where no facade lighting has gone before. Available in 12 in, 24 in, 36 in or 48 in sections, the Lumenfacade Nano Interior is the right fit for general urban structures, historical buildings and those hardest to reach places. The Lumenfacade Nano Interior packs all the bells and whistles of the larger members of the Lumenfacade family and can be configured with a wide number of options, including: optics for grazing, floodlighting, or wall washing; a choice of outputs; various color temperatures or static colors; various mounting options, finishes, accessories and controls. The Lumenfacade Nano Interior is also available with a unique asymmetric distribution, providing exceptional uniformity and brightness for walls and signage.

Features

Color and Color Temperature	2200K, 2700K, 3000K, 3500K, 4000K, Red, Green, Blue
Length (nominal)	12 in, 24 in, 36 in, 48 in
Optics	8° x 8°, 10° x 10°, 10° x 30°, 10° x 60°, 10° x 90°, 30° x 10°, 30° x 30°, 30° x 60°, 30° x 90°, 60° x 10°, 60° x 60°, 60° x 90°, 90° x 90°, Wide 120°, Asymmetric Wallwash
Power Consumption	2 W/ft, 4 W/ft
Warranty	5-year limited warranty

lumenpulse™

1220 Marie-Victorin Blvd., Longueuil, QC J4G 2H9 CA **T** United States 617.307.5700 | Canada 1.877.937.3003 | 514.937.3003 **F** 514.937.6289
info@lumenpulse.com **www.lumenpulse.com** **www.lumenpulse.com/en/products/1576/lumenfacade-nano-interior**

Configured Specification Sheet

lumenfacade nano

Interior
LOGNI

WHITE AND STATIC COLORS

Colors and Color Temperatures

2200K 2700K 3000K 3500K 4000K

Red Green Blue

Controls

ON/OFF UCTL

Ratings

IP20 IK08

Certifications

Performance

Delivered Output	884 lm (2 W/ft, 48 in fixture, 4000K, 30° x 30°, UCTL), 1,767 lm (4 W/ft, 48 in fixture, 4000K, 30° x 30°, UCTL)
Delivered Intensity	20,676 cd at nadir (2 W/ft, 48 in fixture, 4000K, 8° x 8°, UCTL), 41,352 cd at nadir (4 W/ft, 48 in fixture, 4000K, 8° x 8°, UCTL)
Illuminance at Distance	Minimum 1 fc at 144 ft (2 W/ft, 48 in fixture, 4000K, 8° x 8°, UCTL), Minimum 1 fc at 203 ft (4 W/ft, 48 in fixture, 4000K, 8° x 8°, UCTL)
Color Consistency	3 SDCM (2 SDCM for 8° x 8°, 10° x 10°, 10° x 30°, 10° x 60°, 10° x 90°, 30° x 10°, 60° x 10°, W and WW optics)
Color Rendering	CRI 80+
Lumen Maintenance	L70 >90,000 hrs

Physical

Housing Material	Low copper content extruded aluminum
Lens Material	Clear tempered glass
Hardware Material	Stainless steel
End Cap Material	Machined aluminum
Surface Finish	Electrostatically applied polyester powder coat
Weight	1.4 lbs (12 in), 2.9 lbs (24 in), 4.4 lbs (36 in), 6 lbs (48 in)

Electrical and control

Voltage	48 VDC
Resolution (DMX/RDM)	Per fixture, 8-bit or 16-bit
Control	On/Off control, Universal control (compatible with 0-10V, DALI or DMX/RDM systems)

Environmental

Environment	Indoor applications only
Storage Temperature	-40 °F to 185 °F (device must reach start-up temperature value before operating)
Start-up Temperature	-13 °F to 122 °F
Operating Temperature	-40 °F to 122 °F
Ingress Protection Rating	IP20
Impact Resistance Rating	IK08 (IK09 for 48 in fixtures)

lumenpulse™

1220 Marie-Victorin Blvd., Longueuil, QC J4G 2H9 CA **T** United States 617.307.5700 | Canada 1.877.937.3003 | 514.937.3003 **F** 514.937.6289
info@lumenpulse.com **www.lumenpulse.com** **www.lumenpulse.com/en/products/1576/lumenfacade-nano-interior**

Accessories (order separately)

Cables	Lumenfacade Nano Jumper Cable, Trunk Power Cable, Trunk Data Cable
Control Boxes	Low-Voltage Control Box, Low-Voltage Splitter Box
Optical Accessories	Lumenfacade Nano Radial Louver, Lumenfacade Nano Visor
Control Systems	Lumentone™ 2, Pharos® kit
Diagnostic and Addressing Tools	LumenID

Configured Specification Sheet

lumenfacade nano

Interior
LOGNI

WHITE AND STATIC COLORS

How to order

1	2	3	4	5	6	7	8
LOGNI	4W	48V	48	30K	30x30	FR	WAMN2

9	10	11
WH	UCTL	UL

1 . Housing

LOGNI	Lumenfacade™ Nano Interior

2 . Wattage

2W	2 W/ft [1]
4W	4 W/ft

[1] Not available for static red, green or blue color options.

3 . Voltage

48V	48 VDC

4 . Length

12	12 3/4 in (1.4 lbs)
24	24 3/4 in (2.9 lbs)
36	36 3/4 in (4.4 lbs)
48	48 3/4 in (6 lbs)

5 . Color and Color Temperature [1]

22K	2200K
27K	2700K
30K	3000K
35K	3500K
40K	4000K
RD	Red [2]
GR	Green [2]
BL	Blue [2]

[1] Consult factory for availability of static Royal Blue, 6500K and 90+ CRI.

[2] Static colors made to order 8-10 weeks.

6 . Optics

8x8	8° x 8°
10x10	10° x 10°
10x30	10° x 30°
10x60	10° x 60°
10x90	10° x 90°
30x10	30° x 10°
30x30	30° x 30°
30x60	30° x 60°
30x90	30° x 90°
60x10	60° x 10°
60x60	60° x 60°
60x90	60° x 90°
90x90	90° x 90
W	Wide 120°
WW	Asymmetric Wallwash

7 . Lens

CL	Clear lens [1]
FR	Frosted lens [2]
HFR	Half-frosted lens [3]

[1] Not available for 8x8, 10x10, W or WW optics.

[2] Not available for WW optic.

[3] Available for 8x8, 10x10 or WW optics only.

8 . Mounting Options [1]

SAMN	Slim Adjustable Mounting Nano
UMPN	Fixed Mounting Nano
UMASN	Universal Adjustable Mounting Nano
WAMN2	Adjustable Wall Mounting Nano 2 in
WAMN6	Adjustable Extended Arm Mounting Nano 6 in
WAMN12	Adjustable Extended Arm Mounting Nano 12 in
WAMN18	Adjustable Extended Arm Mounting Nano 18 in

[1] One mounting bracket provided for 12 in fixtures. Two mounting brackets provided for 24 in, 36 in and 48 in fixtures.

lumenpulse™

1220 Marie-Victorin Blvd., Longueuil, QC J4G 2H9 CA **T** United States 617.307.5700 | Canada 1.877.937.3003 | 514.937.3003 **F** 514.937.6289
info@lumenpulse.com **www.lumenpulse.com** **www.lumenpulse.com/en/products/1576/lumenfacade-nano-interior**

9 . Finish

BK	Black Sandtex®
BRZ	Bronze Sandtex®
SI	Silver Sandtex®
WH	Smooth white
CC	Custom color and finish (please specify RAL color) [1]

[1] Lumenpulse offers a wide selection of RAL CLASSIC (K7) colors with a smooth texture and high-gloss finish. Please consult factory for a list of available K7 colors, other RAL textures and glosses, or to match alternate color charts. Final color matching results may vary.

10 . Control [1]

NO	On/Off control
UCTL	Universal control (compatible with 0-10V, DALI or DMX/RDM systems)

[1] A Low-Voltage Control Box (LCBX) or Low-Voltage Splitter Box (LSBX) and LumenID (LID) must be specified.

11 . Certification

UL	UL compliant
CE	CE compliant

lumenpulse™

1220 Marie-Victorin Blvd., Longueuil, QC J4G 2H9 CA **T** United States 617.307.5700 | Canada 1.877.937.3003 | 514.937.3003 **F** 514.937.6289
info@lumenpulse.com **www.lumenpulse.com** **www.lumenpulse.com/en/products/1576/lumenfacade-nano-interior**

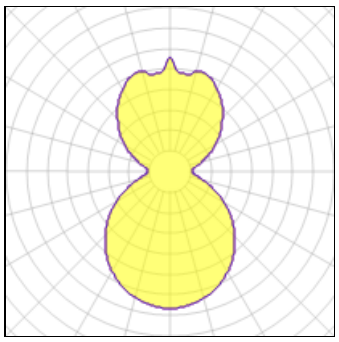
Product data sheet

RING OF FIRE
311570.004.730
RZB

IP 20 IK 02

Series: Ring of Fire Type of Protection: IP 20 Protection Class: I Voltage: 220 - 240 V / 50 - 60 Hz Deckenbaldachin (D 263 mm, H 38 mm) Aluminium. Mit Stahlseilabhängung, stufenlos höhenverstellbar. Tragender Ring Aluminium. Abdeckung Glas opal seidenmatt, mundgeblasen. Leuchtmittel (LED) im Lieferumfang enthalten. Mit smart+free Bluetooth-Steuerbaustein zur drahtlosen Vernetzung und Bedienung von Leuchten. Available Colours: anodised aluminium Type of Installation: Pendant Dimensions: D 690, H 81 Lamp: LED Life time: 50000 h (L70/B10) Colour Temperature: 3000K Socket 1: without socket Operating Mode Lamp 1: Konverter dimmbar Bluetooth Safety Marks: F-mark Impact Protection: IK02 (0,20 Joule) Luminaire flux LED: 3800lm System power: 39W Beam Angle: 114° Number of fittings B10A: 12 Number of fittings B16A: 20 Inrush current: 30A Unified Glare Ratio: 13,9 EEC: A++

Light output 1 (integrated)



Lamp type	LED	CCT	3000 K
Nominal lamp power	39 W	CRI	80
Total flux	3800 lm	LOR	100%
Luminous efficacy	97 lm/W	ULOR	45%
		Total power	39 W

Mounting mode

Pendant

Shape and measurements

Height: 3.19 in
Diameter: 27.17 in

Adjustability

Fixed

Electric

System power: 39 W

Protection

IP: 20
IK: 02

Job Name:

Contact:

Ordering Code:

Fixture Type:

Luca

BRUCK LEDRAbrands

ARTISAN GLASS

860 white

861 cappuccino

862 latte

865 clear

866 smoky

867 bourbon

Description
Bruck's European and American Artisan, mouth-blown glass is known throughout the world for its quality and beauty. Several light source options, mounting options, colors and finishes allow for a unique design.

It is offered in matte chrome, chrome or bronze and is compatible with any Bruck line voltage track as well as Halo® single circuit for retrofit. Chrome and matte chrome finish provided with clear cord. Bronze finish provided with black cord. The pendant can be mounted from Bruck's field adjustable 4" Kiss Canopy and accepts GU24(LED/CLF) or medium base lamping options. Standard overall cable length of 59" can be field-cut or specified when ordering.

Ordering Codes

Follow the steps to specify your fixture,

example: **110 - 861 - mc - IN - zonmc**

① Light Source	② Shade Color*	③ Finish	④ Base Option**	⑤ Mounting Option
113 LED	**860** white	**bz** bronze	GU24 base	**MP** 4" Kiss Canopy
110 line voltage	**861** cappuccino	**ch** chrome	**IN** medium E26 base	**ecobk** ECO/HALO black
	862 latte	**mc** matte chrome		**ecosv** ECO/HALO matte silver
	865 clear			**ecowh** ECO/HALO white
	866 smoky			**geobk** GEO black
	867 bourbon			**geosv** GEO matte silver
				geowh GEO white
				zonmc Zonyx matte chrome
				MULTI[1] Line voltage multi-point

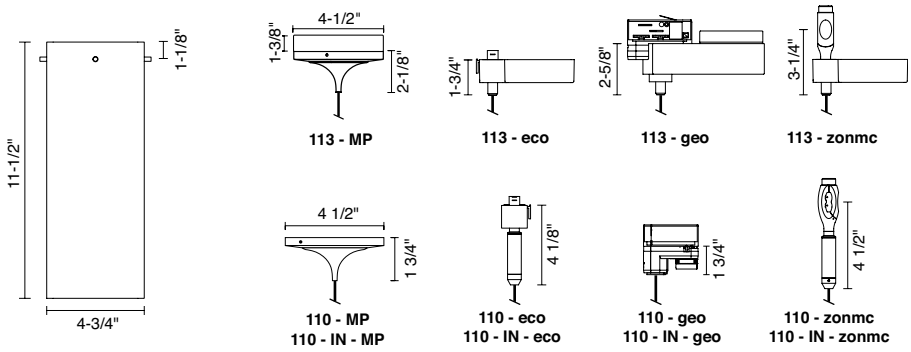
NOTES:
****865, 866, 867 for IN base only***

NOTES:
*****Options for 110 only. IN replaces standard GU24 base for medium E26 base***

NOTES:
[1]MULTI with 110 line voltage only

Job Name:	Contact:
Ordering Code:	Fixture Type:

BRUCK LEDRA brands



Light Source **113** - LED **110** - line voltage (GU24) **110 - IN** - line voltage (E26)

Performance

LED	• Nichia 757D	• lamp dependent	• lamp dependent
LUMENS	• 1000 lm		
CCT	• 3000k		
SDCM	• 3 MacAdam Ellipse, +/- 75 Kelvin		
CRI	• >90		
LIFE	• based on IESNA-LM80-2008: 70% of initial lumens after 60,000 hrs		

Technical Specs

Socket	• integrated LED module	• GU24 base socket	• medium E26 base socket
Listing	• ETLus Listed to UL1598, and UL1574 (Suitable for dry locations only) • cETL Listed to CSA C22.2 #250.0 and #9.0	• ETLus Listed to UL1598, and UL1574 (Suitable for dry locations only) • cETL Listed to CSA C22.2 #250.0 and #9.0	• ETLus Listed to UL1598, and UL1574 (Suitable for dry locations only) • cETL Listed to CSA C22.2 #250.0 and #9.0

Mounting

4" Kiss Canopy	• 100-277VAC, 50/60Hz input • 18W, 20VA • Trailing Edge (ELV) dimming • Mount to 3" - 4" round J-Box	• 120VAC input • 28W, 28VA (max 28W lamp) • Dimmable (with compatible lamp) • Mount to 3" - 4" round J-Box	• 120VAC input • 100W, 100VA (max 100W lamp) • Dimmable (with compatible lamp) • Mount to 3" - 4" round J-Box
Line Voltage Track	• 100-277VAC, 50/60Hz input • 18W, 20VA • Trailing Edge (ELV) dimming • Connects to line voltage adapter (ECO, GEO, Zonyx)	• 120VAC input • 28W, 28VA (max 28W lamp) • Dimmable (with compatible lamp) • Connects to line voltage adapter (ECO, GEO, Zonyx)	• 120VAC input • 100W, 100VA (max 100W lamp) • Dimmable (with compatible lamp) • Connects to line voltage adapter (ECO, GEO, Zonyx)
MULTI		• 120VAC input • 28W, 28VA (max 28W lamp) • Dimmable (with compatible lamp) • Mount to line voltage multi-point canopy • Provided with field adjustable cord only	• 120VAC input • 100W, 100VA (max 100W lamp) • Dimmable (with compatible lamp) • Mount to line voltage multi-point canopy • Provided with field adjustable cord only

Warranty

	• 5 year limited fixture warranty	• 1 year limited fixture warranty	• 1 year limited fixture warranty

made in the USA

ARTISAN GLASS

Made in the USA - meets the requirements of the Buy American provision within the ARRA

Job Name:

Contact:

Ordering Code:

Fixture Type:

Vintage LED Lamps for E26 base sockets

BRUCK LEDRA brands

- Amber Glass Lamp with Thread LED
- Integrated Driver-Free System
- Suitable for Damp Locations
- Smooth Dimming System*
- 25,000 Hours Warranty
- 95% Energy Savings

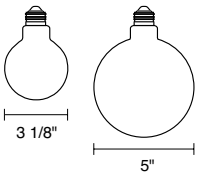
*Compatible with most electronic low voltage (ELV) dimmers

c UL us

Pb lead-free

RoHS 2002/95/EC

LED Globe Lamp



Ordering Codes
Follow the steps to specify your fixture,

example: LMP-G2518022K1

Ordering Code	Type	Base	Lumen	Wattage /EQV	MOL	MOD	CCT²
LMP-G4030022K1 LMP-G2518022K1	G40 G25	E26 E26	300lm 180lm	3.5W / 60W 2.0W / 40W	7.0” 4.5”	5.0” 3.15”	2200K 2200K

LED Edison Lamp

Ordering Codes
Follow the steps to specify your fixture,

example: LMP-ED2118022K1

Ordering Code	Type	Base	Lumen	Wattage /EQV	MOL	MOD	CCT²
LMP-ED2118022K1	ST21	E26	180lm	2.0W / 40W	5.4”	2.45”	2200K

LED Tubular Lamp

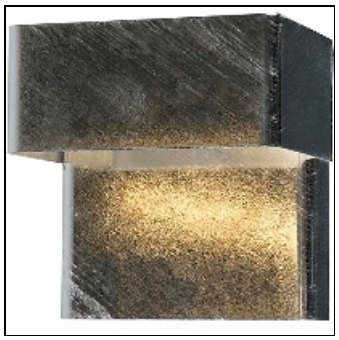
Ordering Codes
Follow the steps to specify your fixture,

example: LMP-TB1030022K1

Ordering Code	Type	Base	Lumen	Wattage /EQV	MOL	MOD	CCT²
LMP-TB1030022K1	T10	E26	300lm	3.5W / 60W	7.56”	1.25”	2200K

Product data sheet

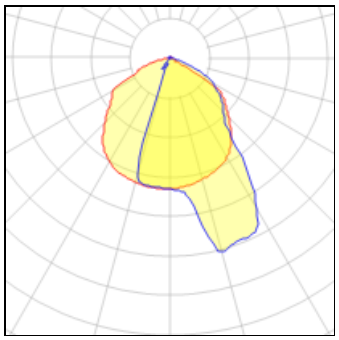
DORIS GALVAD
E77XXXXX
ELEKTROSKANDIA SVERIGE



IP 65 IK 04

Doris är en robust väggarmatur. Utförande: Stomme i galvad stålplåt. Ljuskälla: LED 3000K SDCM 3 Ra>80, L70B10 50.000 timmar vid Ta25°C. Anslutning: Införingshål på baksidan, instickssplint 3x2x2,5 mm². Övrigt: Tänder ner till -45°C. OBS! Minkvantitet 15st.

Light output 1 (integrated)



Lamp type	LED	CCT	3114 K
Nominal lamp power	9.8 W	CRI	80
Total flux	760 lm	LOR	100%
Luminous efficacy	78 lm/W	ULOR	2%
		Total power	9.8 W

Mounting mode

Wall mounted

Shape and measurements

Length: 9.06 in
Width: 3.54 in
Height: 9.06 in

Adjustability

Fixed

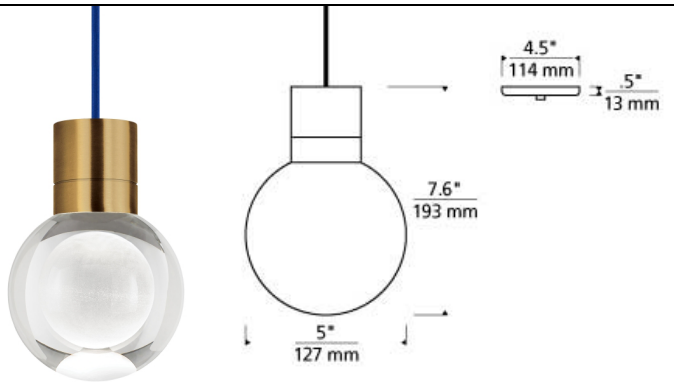
Electric

System power: 9.8 W
Appliance Class: I

Protection

IP: 65
IK: 04

Mina Pendant LED



DESCRIPTION
The Mina pendant light from Tech Lighting features an elegant sphere of pure optic crystal. This beautiful floating orb is laser-etched and further illuminated by a powerful downward-firing LED hidden within the socket. Although smaller in diameter, the Mina brilliantly provides a bounty of task light onto surfaces below. Highly customizable, the Mina pendant features 8 cord colors and three on-trend finish options. The Mina ships with your choice of fully dimmable LED lamping. In addition to the wide range of customizable options, the Mina pendant also comes with two complementary accessory options. Swag Hooks and the Locus accessory. Due to its contemporary yet raw style, the Mina can be used in a range of consumer and commercial lighting applications. Includes 9 watt, 135 delivered lumen, 3000K, 2200K or 3000K-2200K warm-color dimming LED module. Fixture provided with twelve feet of field-cuttable cloth cord. Dimmable with low-voltage electronic or triac dimmer.

INSTALLATION
This product can mount to either a 4" square electrical box with round plaster ring or an octagon electrical box.

WEIGHT
19.5-21lb / 8.85-9.53kg ±

aged brass black & white cord | black finish black/white cord | satin nickel finish black/white cord | aged brass black cord | black finish black cord | satin nickel finish black cord | aged brass blue cord | black finish blue cord | satin nickel finish blue cord

ORDERING INFORMATION

700 SYSTEM **MINAP**

	SHAPE OR SIZE	COLOR	Cord Color	FINISH	LAMP
TD LINE-VOLTAGE PENDANTS/SUSPENSION	**11** 11-LITE CHANDELIER **1** 1-LITE **3** 3-LITE CHANDELIER **7** 7-LITE CHANDELIER	**C** CLEAR	**B** BLACK **I** BLACK/WHITE **U** BLUE **P** COPPER **Y** GRAY **O** ORANGE **R** RED **W** WHITE	**R** AGED BRASS **B** BLACK **S** SATIN NICKEL	**-** LED 90 CRI 2200K 120V (T24) **LED922** **-** LED 90 CRI 3000K 120V (T24) **LED930** **-** LED 90 CRI WARM COLOR DIMMING 3000K - 2200K **LEDWD**120V (T24)

TECH LIGHTING®
7400 Linder Avenue
Skokie, Illinois 60077
T 847.410.4400
F 847.410.4500

Tech Lighting, L.L.C.

700 ____ MINAP ____ ____ ____ ____ ____

FIXTURE TYPE: _____

JOB NAME: _____

NOTES: _____

_____

_____

EHA

Forced-Air Architectural Wall Heater

With surface mounting box

Recessed


1


2


3


4

Features

Color
- Standard: white, almond, metallic silver, bronze, metallic charcoal, aluminum, semi-gloss black.
- Custom colors available upon request.

Finish
- Standard: epoxy/polyester powder paint.
- Optional: anodized aluminum.

Voltage
- 120V, 208V, 240/208V, 277V, 347V, 480V, 600V, 1-phase.

Construction
- Extruded aluminum front grille, 1/8 in. (3.2 mm) thick. 1
- Bottom air outlet.
- High-limit temperature control with automatic reset.

Fan
- Closed, factory-lubricated motor.
- 160 cfm fan (single unit: 55 dBA); 2 X 160 cfm fan (double unit: 58 dBA), 3 X 160 cfm fan (triple unit: 61 dBA). 2
- Fan delay purges heater of residual heat.

Heating element
- Durable tubular heating element with fins. 3

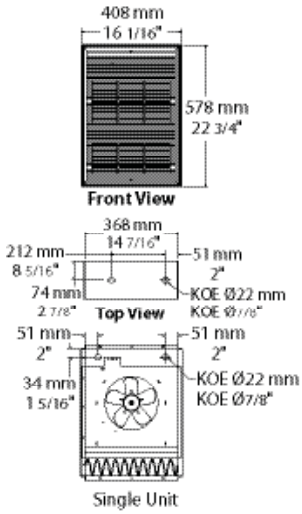
Control
- Built-in tamper proof thermostat included. 4
- 24V relay, with or without transformer available.

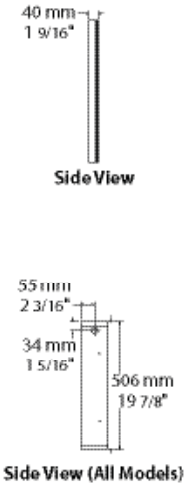
Note: Thermostat is not included in heater with factory installed relay. Any remote thermostat or relay must be connected to the heater control terminal block.

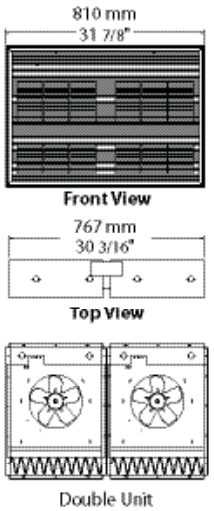
Installation
- Minimum clearance from the floor and adjacent walls: 10 in. (25.4 cm).
- Adaptor for surface mounting available.
- Up to 3 units can be mounted side-by-side

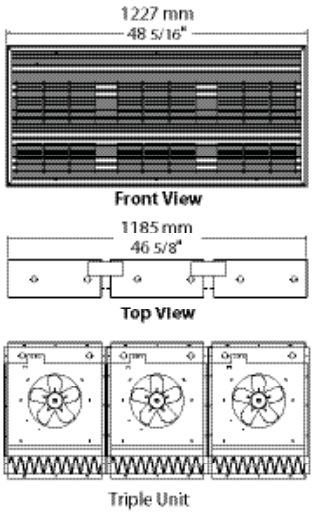
Warranty
- 3-year warranty against defects.

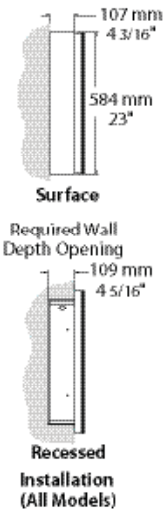
Application
- Apartment building, commercial building, entrance way, stairwell, garage.











EHA

		Size	1	2	3	4	5
Heating Capacity		**W**	1500	2000	3000	4000	4800
		BTUH	5125	6825	10250	13660	16400
Ship Weight		**Lbs**	24	24	24	24	24
		Kg	10.9	10.9	10.9	10.9	10.9
Factory Installed Options							
Supply Voltage/Phase	120/1	**AK1E**	✓	■	■	■	■
	208/1	**AK2**	■	✓	■	✓	✓
	240/1 [1]	**AK3E**	✓	✓	✓	✓	■
	277/1	**AK4**	✓	✓	✓	✓	✓
	480/1	**AK9E**	✓	✓	✓	✓	✓
Cabinet Color (Lead times may be increased for colors other than white)	White (STD)	**HK1**	✓	✓	✓	✓	✓
	Almond	**HK2**	✓	✓	✓	✓	✓
	Metallic Silver	**HK3**	✓	✓	✓	✓	✓
	Bronze	**HK4**	✓	✓	✓	✓	✓
	Metallic Charcoal	**HK5**	✓	✓	✓	✓	✓
	Aluminum	**HK8**	✓	✓	✓	✓	✓
	Semi-Gloss Black	**HK9**	✓	✓	✓	✓	✓
	Special Color	**SPEC**	Call for quote (volume orders only)				
Thermostat	Hidden, tamper-proof, built-in thermostat	**STD**	✓	✓	✓	✓	✓
Control Voltage	120V, 208V, 240V, 277V & 480V	**STD**	✓	✓	✓	✓	✓
	24V Relay with transformer [2]	**BT1**	✓	✓	✓	✓	✓
Disconnect Switch [3]	Up to 277V, 2-pole, 20A	**BA21**	✓	✓	✓	✓	✓
	600V max., 3-pole, 40A	**BA14**	✓	✓	✓	✓	✓
Field Installed Options (shipped separately)							
		Size	**1**	**2**	**3**	**4**	**5**
Color Matched Trim Packages	Surface mounting box required for non-recessed units	**HY6**	✓	✓	✓	✓	✓

[1] Units with Option AK3E (240V supply voltage) can be connected to 208V power supply, but heating output will be reduced by 25%.
[2] Built-in transformer is not included with 24V control voltage (Option BT1).
[3] For the U.S. only: The nominal current of the unit must not exceed 80% of the capacity of the disconnect.

AWH SERIES

ARCHITECTURAL HEAVY-DUTY WALL HEATER

IDEAL SPACES

- Vestibules
- Entrance Ways
- Lobbies
- Hallways
- Stairwells
- Restaurants
- Conference Rooms
- Offices
- Basements
- Family Rooms

COLORS

- Northern White
- Statuary Bronze

DIMENSIONS

- Grille: 19-5/16”H x 15-3/4”W
- Back Box: 18-1/4”H x 14-3/8”W

TEMP RANGE

- 40°-90°F

CFM

- 100

STATUARY BRONZE
& NORTHERN WHITE

- BMS-compatible through an optional relay
- Contemporary bar-stock grille designed to provide optimized airflow
- Manual reset thermal overheat protector disconnects power in the event of accidental blockage
- Built-in tamper-reisistant thermostat
- All units have a permanently lubricated and enclosed fan motor, which creates long life, low maintenance, and gently distributes warmth throughout the area
- Automatic fan delay eliminates cold drafts on start-up and discharges residual heat from the heater body during shut down
- Power on/off switch for added safety during maintenance

Intertek

5 YEAR WARRANTY ELEMENT

1 YEAR WARRANTY WORKMANSHIP

AWH SERIES
ARCHITECTURAL HEAVY-DUTY WALL HEATER

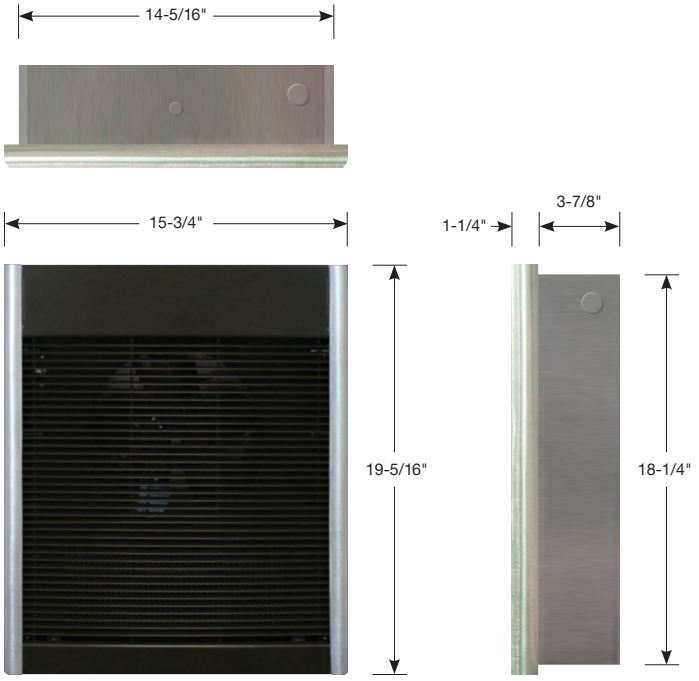
MODELS & SPECIFICATIONS

CATALOG NO.	UPC	VOLTS	WATTS	AMPS	PHASES	BTU/HR.	SHIP WT. (LBS.)
AWH3150F	6 85360 16186 0	120	1500	12.5	1	5118	25
AWH3180F	6 85360 16188 4	120	1800	15	1	6142	25
AWH4408F	6 85360 16210 2	208	4000/2000	19.2 / 9.6	1	13,649/6824	25
AWH4404F	6 85360 16198 3	240	4000/2000	16.7/8.3	1	13,649/6824	25
		208	3000/1500	14.4 / 7.2		10,236/5118	
AWH4407F	6 85360 16206 5	277	4000/2000	14.4 / 7.2	1	13,649/6824	25
		240	3000/1500	12.5/6.3		10,236/5118	
AWH4307F	6 85360 16194 5	277	3000/1500	10.8 / 5.4	1	10,236/5118	25
AWH4303F	6 85360 16402 1	347	3000	8.6	1	10,236	25
AWH4306F	6 85360 16406 9	600	3000	5	1	10,236	25
AWH4506F	6 85360 16414 4	600	4800	8	1	16,378	25
AWH4508F	6 85360 16230 0	208	4800	23.1	1	16,378	25
AWH4504F	6 85360 16218 8	240	4800	20	1	16,378	25
		208	3600	17.3		12,284	
AWH4507F	6 85360 16226 3	277	4800	17.3	1	16,378	25
		240	3600	15		12,284	
AWH4503F	6 85360 16410 6	347	4800	13.8	1	16,378	25
AWH44083F	6 85360 16214 0	208	4000	11.1	3	13,649	25
AWH45083F	6 85360 16222 5	208	4800	13.3	3	16,378	25
AWH44043F	6 85360 16202 7	240	4000	9.6	3	13,649	25
AWH45043F	6 85360 16234 8	240	4800	11.6	3	16,378	25

NOTE: *Factory-wired for higher wattage, field-convertible to half wattage. Standard finish is Statuary Bronze; For Northern White, add NW suffix to catalog number. Allow two weeks delivery for models with Northern White finish.

ACCESSORIES

CATALOG NO.	UPC	DESCRIPTION	SHIP WT. (LBS)
AWHPE*	6 85360 00721 2	Pneumatic/Electric switch. Factory set at 10 PSIG to "make" on pressure drop. May be field wired to "break" on pressure drop. Pressure set point adjustable to 30 PSIG. (field-installed)	2
AWHR2 (24V)*	6 85360 00723 6	Time delay relay 40-60 seconds to close when energized. Use 120V or 24V power supply from remote source (field-installed)	2
AWHR12 (120V)*	6 85360 00722 9		
AWHS1	6 85360 00726 7	1 in. deep surface mounting frame for semi-recessed installation, Statuary Bronze	2
AWHS2	6 85360 00728 1	2 in.deep surface mounting frame for semi-recessed installation, Statuary Bronze	2
AWHSM	6 85360 00724 3	Surface mounting frame for surface installations. Painted to match heater decor, 3-13/16 in. deep, Statuary Bronze	5
LFKSFCNW	6 85360 16079 5	14-gauge security front cover, Northern White	6



NOTE: * Will accommodate pneumatic/electric or low-voltage controls commonly used with computerized energy management systems Mounting Limitations: For wall mounting, do not install back box closer than 8 in. from floor or adjacent wall. Do not install heater behind towel rack, behind door, in floor, in closet, in ceiling or where air flow may be obstructed. All controls are concealed behind the front cover making them essentially tamper proof.

MUH SERIES
UNIT HEATER

IDEAL SPACES
- Factories
- Warehouses
- Garages
- Stairwells
- Shipping Docks
- Power Stations
- Mechanical Rooms

COLORS
- Neutral Gray/Statuary Bronze

DIMENSIONS
- Varies (see diagram)

TEMP RANGE
- 40°– 90°F

CFM
- 350 – 3000

- Wide range of optional control kits are field-installable, increasing the unit's adaptability to specification market
- Small- to medium-case construction is 20-gauge steel with larger cabinet 18-gauge steel; completely enclosed fan motor
- Advanced pull-through air flow design draws air across heating element for even air distribution and cooler element operation
- Specially designed venturi outlet to meet required additional air throw in vertical position
- Branch circuit fusing (when required)
- 2-speed fan selector switch (25 to 50 kW models) and optional fan-only switch for air movement with no heat
- 1- or 3-phase wiring on 5 kW through 10 kW 208/240V and 15 kW 208V units (field-interchangeable)
- Aluminum-finned, copper-clad steel sheath heating element extends life due to cooler sheath temperature and faster heat dissipation
- 24V control transformer standard on most models, providing safer and more accurate means of temperature control. 3 kW and 5 kW, 208-277V, have line voltage controls as standard (24V control available on made-to-order basis)
- Automatic reset linear thermal cut-out, capillary type, provides protection over entire length of element areas (manual reset protection available on made-to-order basis)
- No piping flues, valves or traps needed for installation
- Individual stainless steel adjustable louvers to direct air flow

c UL us

5 YEAR WARRANTY ELEMENT

1 YEAR WARRANTY WORKMANSHIP

MUH SERIES
UNIT HEATER

MODELS & SPECIFICATIONS

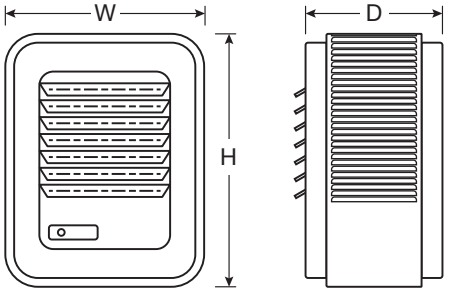
CATALOG NO.	UPC 6-85360	VOLTS	ELECTRICAL DATA			AMPS (3)	CONTROL VOLT (1)	2 STAGE ELEMENT CONTROL	AIR DELIVERY DATA FAN MOTOR DATA					MOUNTING HEIGHT			HOROIZ. THROW	WIRE SIZE	SHIP WT. (LBS.) W/ BRCKT
			PHASE	KW	BTU/HR.				CFM (2)	FPM (2)	ΔT(°F)	VOLTS	RPM (2)	HP	HORIZ.	VERT.			
MUH0381	04721 8	208	1	3	10.2	14.5	208	N/A	350	800	27°	208	1600	1/100	8	9	12	AWG 12	27
MUH0581*	04728 7	208	1-3	5	17	24	208	5A	350	800	45°	208	1600	1/100	8	9	12	AWG 10	27
MUH078	04735 5	208	1-3	7.5	25.6	36	24	5B	650	970	37°	208	1600	1/30	9	14	18	AWG 6	38
MUH108	04741 6	208	1-3	10	34.1	48	24	5B	650	970	49°	208	1600	1/30	9	14	18	AWG 4	38
MUH158	04745 4	208	1-3	15	51.2	72	24	5A	910	1640	52°	208	1530	1/20	11	20	35	AWG 2	53
MUH208	04749 2	208	3	20	68.2	56	24	5A	1320	2060	48°	208	1500	1/10	12	23	41	AWG 4	60
MUH308	04756 0	208	3	30	102.3	84	24	5A	2100/1800	2100/2030	45°/53°	208	1600/1375	1/4	12	20	50	AWG 1	93
MUH508	04766 9	208	3	50	170.5	139	24	5A	3000/2600	3260/2900	53°/61°	208	1525/1420	1/2	15	25	60	AWG 4/0	114
MUH0321	04716 4	208/240	1	2.2/3.0	7.5/10.2	11.0/12.5	208/240	N/A	350	800	27°	208/240	1600	1/100	8	9	12	AWG 12	27
MUH0521*	04722 5	208/240	1-3	3.7/5.0	12.6/17.0	18.0/21.0	208/240	5A	350	800	45°	208/240	1600	1/100	8	9	12	AWG 10	27
MUH072	04730 0	208/240	1-3	5.6/7.5	19.1/25.6	27.0/31.3	24	5B	650	970	37°	208/240	1600	1/30	9	14	18	AWG 8	38
MUH102	04736 2	208/240	1-3	7.5/10.0	25.6/34.1	36.0/42.0	24	5B	650	970	49°	208/240	1600	1/30	9	14	18	AWG 6	38
MUH152	04742 3	208/240	3	11.2/15.0	38.2/51.2	31.3/36.1	24	5C	910	1640	52°	208/240	1530	1/20	11	20	35	AWG 6	53
MUH202	04746 1	208/240	3	15.0/20.0	51.2/68.2	41.2/48.0	24	5C	1320	2060	48°	208/240	1500	1/10	12	23	41	AWG 4	60
MUH252	04750 8	208/240	3	18.7/25.0	63.8/85.2	52.0/60.0	24	5A	2100/1800	2100/2030	38°/44°	208/240	1600/1375	1/4	13	23	50	AWG 3	93
MUH302	04753 9	208/240	3	22.5/30.0	76.7/102.3	63.0/72.3	24	5A	2100/1800	2100/2030	45°/53°	208/240	1600/1375	1/4	12	20	50	AWG 2	93
MUH402	04760 7	208/240	3	30.0/40.0	102.3/136.4	83.4/96.4	24	5A	3000/2600	3260/2900	42°/49°	208/240	1525/1420	1/2	15	28	60	AWG 1/0	114
MUH502	04763 8	208/240	3	37.5/50.0	127.3/170.5	104.2/120.4	24	5A	3000/2600	3260/2900	53°/61°	208/240	1525/1420	1/2	15	25	60	AWG 3/0	114
MUH0371	04720 1	277	1	3	10.2	11	277	N/A	350	800	27°	277	1600	1/100	8	9	12	AWG 14	27
MUH0571	04727 0	277	1	5	17	18	277	N/A	350	800	45°	277	1600	1/100	8	9	12	AWG 10	27
MUH077	04734 8	277	1	7.5	25.6	27	24	5B	650	970	37°	277	1600	1/30	9	14	18	AWG 8	38
MUH107	04740 9	277	1	10	34.1	36	24	5B	650	970	49°	277	1600	1/30	9	14	18	AWG 6	38
MUH0341	04718 8	480	3	3	10.2	3.6	24	N/A	350	800	27°	480	1600	1/100	8	9	12	AWG 14	27
MUH0541	04725 6	480	3	5	17	6	24	N/A	350	800	45°	480	1600	1/100	8	9	12	AWG 14	27
MUH074	04732 4	480	3	7.5	25.6	9	24	5B	650	970	37°	480	1600	1/30	9	14	18	AWG 14	38
MUH104	04738 6	480	3	10	34.1	12	24	5B	650	970	49°	480	1600	1/30	9	14	18	AWG 14	38
MUH154	04743 0	480	3	15	51.2	18	24	5C	910	1640	52°	480	1530	1/20	11	20	35	AWG 10	53
MUH204	04747 8	480	3	20	68.2	24	24	5C	1320	2060	48°	480	1500	1/10	12	23	41	AWG 10	60
MUH254	04751 5	480	3	25	85.2	30	24	5C	2100/1800	2100/2030	38°/44°	480	1600/1375	1/4	13	23	50	AWG 8	93
MUH304	04754 6	480	3	30	102.3	36	24	5C	2100/1800	2100/2030	45°/53°	480	1600/1375	1/4	12	20	50	AWG 6	93
MUH404	04761 4	480	3	40	136.4	48	24	5A	3000/2600	3260/2900	42°/49°	480	1525/1420	1/2	15	28	60	AWG 4	114
MUH504	04764 5	480	3	50	170.5	60.2	24	5A	3000/2600	3260/2900	53°/61°	480	1525/1420	1/2	15	25	60	AWG 4	114
MUH0331	04717 1	347	1	3	10.2	8.6	347	N/A	350	800	27°	347	1600	1/100	8	9	12	AWG 14	27
MUH0531	04724 9	347	1	5	17	14.4	347	N/A	350	800	45°	347	1600	1/100	8	9	12	AWG 10	27
MUH073	04731 7	347	1	7.5	25.6	21.6	24	5B	650	970	37°	347	1600	1/30	9	14	18	AWG 14	38
MUH103	04737 9	347	1	10	34.1	28.8	24	5B	650	970	49°	347	1600	1/30	9	14	18	AWG 14	38
MUH0361	04719 5	600	3	3	10.2	2.9	24	N/A	350	800	27°	600	1600	1/100	8	9	12	AWG 14	27
MUH0561	04726 3	600	3	5	17	4.8	24	N/A	350	800	45°	600	1600	1/100	8	9	12	AWG 10	27
MUH076	04733 1	600	3	7.5	25.6	7.3	24	5B	650	970	37°	600	1600	1/30	9	14	18	AWG 14	38
MUH106	04739 3	600	3	10	34.1	9.7	24	5B	650	970	49°	600	1600	1/30	9	14	18	AWG 14	38
MUH156	04744 7	600	3	15	51.2	14.5	24	5C	910	1640	52°	600	1530	1/20	11	20	35	AWG 12	53
MUH206	04748 5	600	3	20	68.2	19.3	24	5C	1320	2060	48°	600	1500	1/10	12	23	41	AWG 12	60
MUH256	04752 2	600	3	25	85.2	24.2	24	5C	2100/1800	2100/2030	38°/44°	600	1600/1375	1/4	13	23	50	AWG 10	93
MUH306	04755 3	600	3	30	102.3	29	24	5C	2100/1800	2100/2030	45°/53°	600	1600/1375	1/4	12	20	50	AWG 8	93
MUH406	04762 1	600	3	40	136.4	38.7	24	5A	3000/2600	3260/2900	42°/49°	600	1525/1420	1/2	15	28	60	AWG 6	114
MUH506	04765 2	600	3	50	170.5	48.3	24	5A	3000/2600	3260/2900	53°/61°	600	1525/1420	1/2	15	25	60	AWG 3	114

NOTE: All standard units are supplied with a low voltage control transformer and contactor (24V) except MUH03 and MUH05, 208V, 240V and 277V models. Low voltage control on these units is available on made to order. All units are also available on special order for 120V control; internal with transformer or external without transformer. On dual-voltage units CFM, FPM, & RPM ratings are listed at higher voltage operation. On dual-phase units maximum amp draw is listed for respective voltage. 25 thru 50 KW models having two-speed motors and dual CFM ratings are listed in Full Line Catalog. 5A. Standard; 5B. Optional - made to order - amp load unbalanced on three-phase; 5C. Optional - made to order - amp load balanced on three-phase.

*Must use two-stage Thermostat on 3Ø operation.

DIMENSIONS

CATALOG NO.	HEIGHT (IN)	WIDTH (IN)	DEPTH (IN)
MUH03 & 05	16	14	7-1/2
MUH07 & 10	21-3/4	19	7-1/2
MUH15 & 20	21-3/4	19	12-3/4
MUH25 & 30	30	26-5/8	11-3/4
MUH40 & 50	30	26-5/8	17-1/8

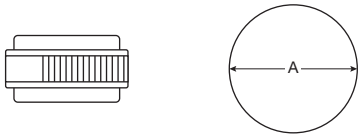
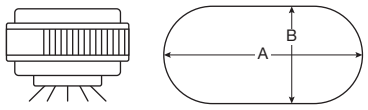


OPTIONAL FIELD-INSTALLED CONTROLS

CATALOG NO.	UPC	DESCRIPTION	ELECTRICAL RATING	COMPATIBLE WITH
UHMT1	6 85360 15241 7	Single Pole Internal Thermostat-Temp Range: 40°- 85°F	25A @ 120, 240VAC Res. 22A @ 277VAC Res.	All MUH Series Heaters (except MUH0521 3 PH, MUH0581 3 PH which use UHMT2)
UHMT2	6 85360 15242 4	Two Stage Internal Thermostat-Temp Range: 40°- 85°F	25A @ 120, 240VAC Res. 22A @ 277VAC Res. 125VA	MUH0521 3 PH, MUH0581 3 PH, MUH158, MUH208, MUH252, MUH302, MUH308, MUH402, MUH404, MUH406, MUH502, MUH504, MUH506, MUH508
MCFS	6 85360 04637 2	Internal Summer Fan Switch 250, 480, 600V.A.C. 1,2 OR 3 PH	Pilot Duty 6A, 600VAC Res. 2 HP	All MUH Series Heaters
MRFS1	6 85360 04708 9	Remote Summer Fan Switch (Line Voltage)	2 HP, 250-480VAC	All MUH Series Heaters
MRFS2	6 85360 04709 6	Remote Summer Fan Switch with Relay (24V Coil-Single Pole Normally Open)	6 AFL, 35 ALR, 250VAC, 60Hz 3 AFL, 18 ALR, 480VAC, 60Hz	All MUH Series Heaters (except MUH0321, MUH0371, MUH0381, MUH0521, MUH0571, MUH0581) Units unless optional control transformer is supplied
MHRT	6 85360 04694 5	Heat Recovery Thermostat with Relay (24V Coil-Single Pole Normally Open) Hi - 120°F, Low - 60°F	6 AFL, 35 ALR, 250VAC, 60Hz 3 AFL, 18 ALR, 480VAC, 60Hz	All MUH Series Heaters (except MUH0321, MUH0371, MUH0381, MUH0521, MUH0571, MUH0581) Units unless optional control transformer is supplied
MPDS25	6 85360 04703 4	Power Disconnect Switch (3-Pole)	30A @ 600VAC, Res.	MUH0321, MUH0341, MUH0371, MUH0381, MUH0521, MUH0541, MUH0571, MUH0581, MUH073, MUH074, MUH076, MUH104, MUH106, MUH154, MUH156, MUH204, MUH206
MPDS60	6 85360 04704 1	Power Disconnect Switch (3-Pole)	80A @ 600VAC, Res.	MUH072, MUH077, MUH078, MUH102, MUH103, MUH107, MUH108, MUH152, MUH202, MUH208, MUH252, MUH254, MUH256, MUH304, MUH306, MUH404, MUH406, MUH504, MUH506

NOTE: Any field installed options assembled in the factory require added surcharge. See price book for charges. MPDS60 disconnect switch is not suitable for field installation on 7.5kw and 10kw unit heaters.

DIFFUSER SELECTOR TABLES FOR VERTICAL MOUNTING

CATALOG NO.	DESCRIPTION	CATALOG NO.	MAX. MOUNTING HEIGHT	(A) DIMENSION	DIFFUSER PATTERN AND AREA
NONE NONE	WITHOUT DIFFUSER No diffuser needed where a straight downflow air pattern is required. For maximum air throw, remove louvers. Any of three diffusers can be added to basic heater.	MUH03 &MUH05 MUH07 & MUH10	9 14	18 26	
NONE NONE		MUH15 MUH20	20 23	35 40	
NONE NONE		MUH25 MUH30	23 20	63 55	
NONE NONE		MUH40 MUH50	28 25	70 63	
MLDS MLDM	LOUVER DIFFUSER Permits directional (straight line) air flow as in air curtain application over doorways. Rectangular coverage, Louvers can be turned in either direction.	MUH03 & MUH05 MUH07 & MUH10	9 14	25(A) 12(B) 39(A) 19(B)	
MLDM MLDM		MUH15 MUH20	18 20	50(A) 25(B) 56(A) 28(B)	
MLDL MLDL		MUH25 MUH30	23 20	72(A) 36(B)	
MLDL MLDL		MUH40 MUH50	24 22	88(A) 44(B) 80(A) 40(B)	

MUH SERIES
UNIT HEATER

OPTIONAL MOUNTING BRACKETS

CATALOG NO.	UPC	COMPATIBLE WITH	SHIP WT. (LBS)
B10	6 85360 15229 5	MUH03 - 10	8
B20	6 85360 15230 1	MUH15 & 20	10
B30	6 85360 15231 8	MUH25 & 30	13
B50	6 85360 15232 5	MUH40 & 50	15

OPTIONAL CEILING MOUNTING BRACKETS

CATALOG NO.	UPC	COMPATIBLE WITH	SHIP WT. (LBS)
CMB10	6 85360 15236 3	MUH03 - 10	3
CMB20	6 85360 15237 0	MUH15 & 20	4
CMB30	6 85360 15238 7	MUH25 & 30	5
CMB50	6 85360 15239 4	MUH40 &50	6

OPTIONAL VERTICAL CEILING MOUNTING BRACKETS

CATALOG NO.	UPC	COMPATIBLE WITH	SHIP WT. (LBS)
VDMB5	6 85360 15245 5	MUH03 - 05	5
VDMB20	6 85360 15246 2	MUH07 - 20	7
VDMB50	6 85360 15247 9	MUH25 - 50	9

MOUNTING LIMITATIONS: Unit heaters should not be used in potentially explosive atmospheres. The finish is not intended for direct salt spray exposure in marine applications or the highly corrosive atmospheres of swimming pools, chemical storage bins, etc. Do not install unit heaters above recommended maximum mounting height. Obstructions must not block unit heater air inlet or discharge. Heaters must be mounted at least 7 ft. above the floor to prevent accidental contact with the heating element or fan blade which could cause injury.

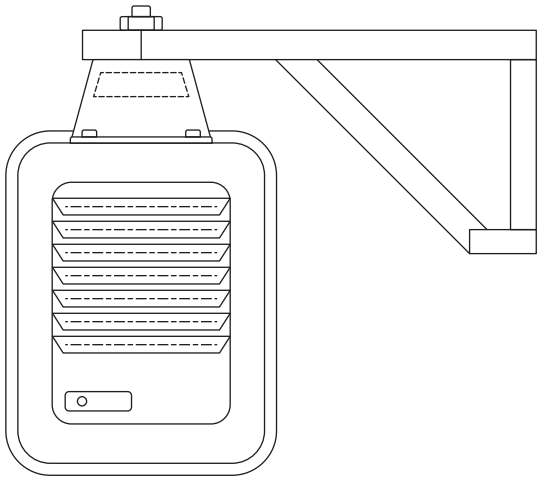
FACTORY-INSTALLED OPTIONS FOR CONTROLS & ACCESSORIES

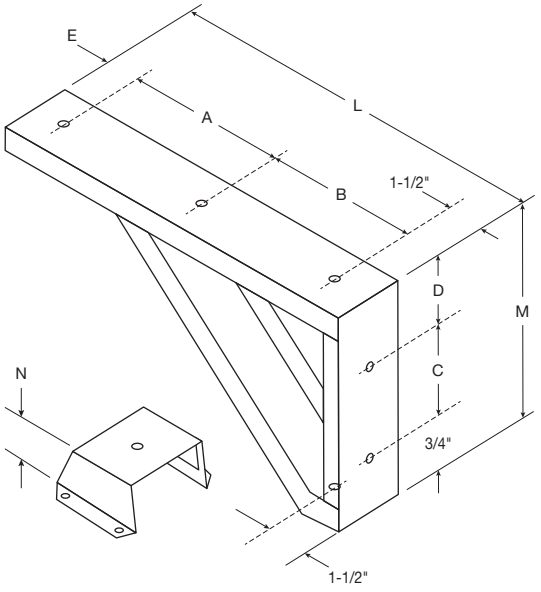
DESCRIPTION
MUH03 & 05 (208, 208/240, 277V Supply) 24 or 120V Control Transformer and Power Contactor 24 or 120V H.C. Power Contactor
MUH03 & 05 (480V Supply) & MUH07 thru MUH50 Optional 120V Control
2-Stage Control of Elements (See Note 5)
Manual Reset
Outlet Mesh (Bird Screen) For all MUH Heaters

NOTE: Any factory-installed options require added surcharge. See price book for charges or contact factory.

BRACKET SIZE

DIMENSION	3-20 kW (IN.)	25-50 kW (IN.)
A	7-1/4	9-7/16
B	9-1/2	14-3/8
C	7-1/4	12-1/8
D	11-5/16	2-1/16
E	2-1/4	3
L	20-1/2	28-15/16
M	9-15/16	14-15/16
N	3-1/4	4-1/2





ABET Paragraphs

Impact on architectural features and other building systems and construction processes

The main way that lighting can support the architecture of a space is through indirect lighting. In my lighting redesign, I used many direct/indirect pendants as well as wall grazers that can illuminate a surface as opposed to illuminating the occupant directly. This not only draws attention to the forms of the architecture but provides diffuse lighting that is easy on the eyes, without the possibility of glare. By redesigning the lighting system, it is also important to avoid the intersection of wiring and device from other systems in the roof plenum, such as electrical wiring or mechanical ducts. If the new luminaires are not all the same voltage, additional panels or converters will also be necessary on the electrical side to support the variety. When redesigning the electrical system, it is important to balance all loads on a panel to minimize current on the neutral. Along with this, any changes to the lighting or mechanical devices will affect the panel loads and in turn could call for a larger panel or wire sizes. As always. Any change to building systems may cause an increase in construction cost or time, even if the changes that have been made might save money in the long run.

How does my proposed design consider public health, safety, welfare, and sustainability factors?

The electrical system in Hyattsville Library has been designed with a generator in the basement that provides power to many panels in the building through multiple ATS, during the event of lost power from the utility. The devices on emergency power include fire alarms, some lighting, controls for the elevators, ventilation in electrical rooms and elevators. These devices help the occupants to be safe and comfortable in the event of an emergency and most importantly help the visitor to exit the library. Part of my mechanical breadth was to replace four heaters with new ones that not only need less load, but they were moved to a panel powered by a solar panel array, saving a lot of energy during the day. In addition to a 40.2kW photovoltaic array on the roof, there is a green roof on a large section of the low roof of the library. The green roof helps with sustainability by improving stormwater management, minimizing the heat island effect, and reducing noise and air pollution.