

# Nature Lab

RHODE ISLAND  
SCHOOL OF DESIGN

## Biophilic Ceiling Installation

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### Materials & Specifications

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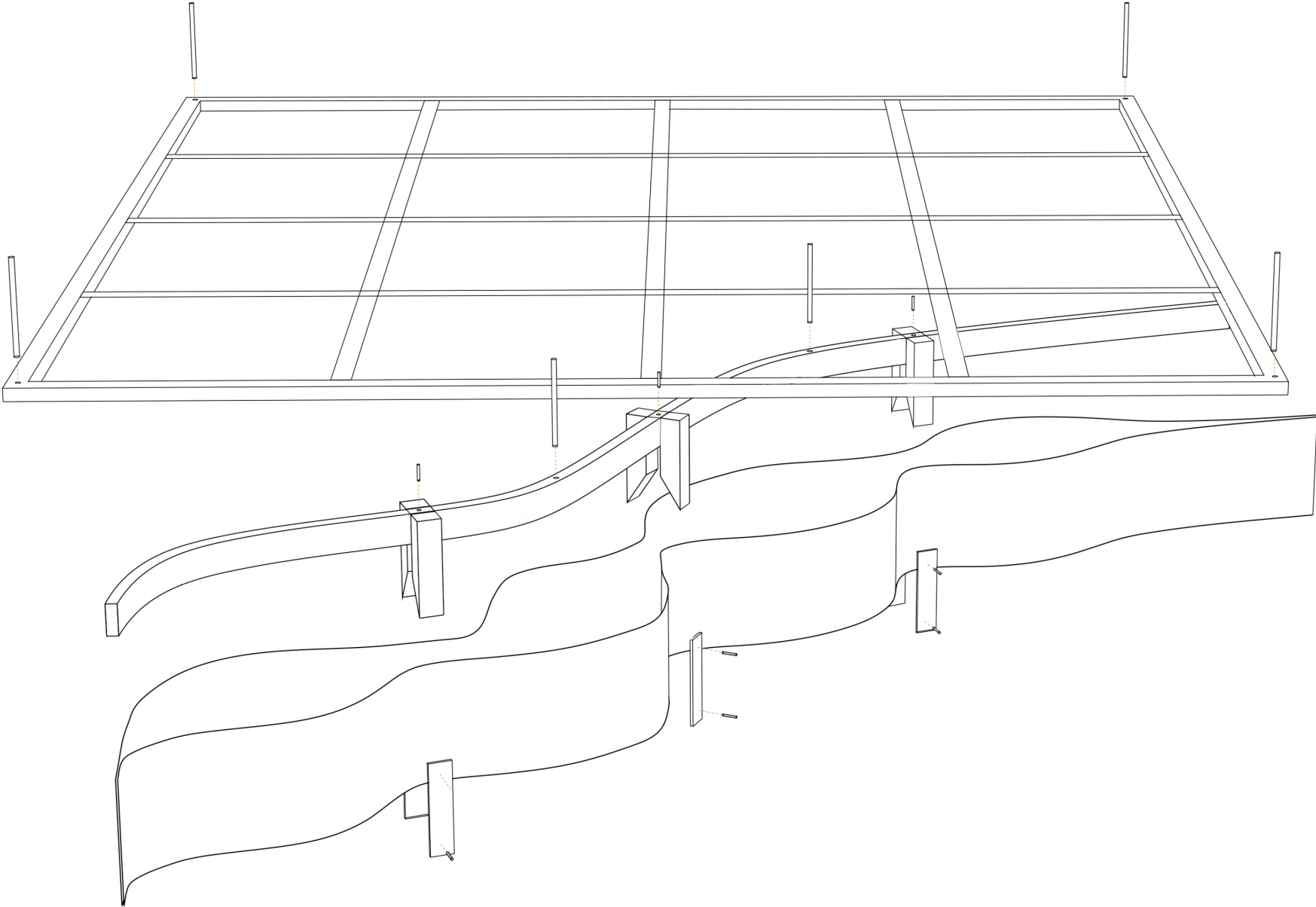
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# Biophilic Ceiling Installation

## Working Prototype Assembly



# Biophilic Ceiling Installation

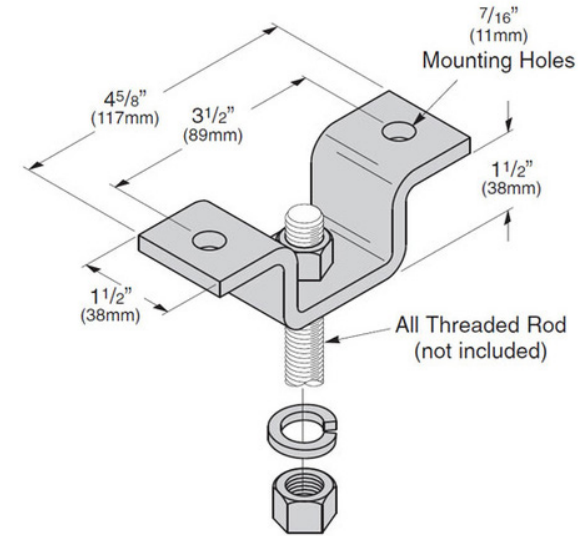
## Armature Specifications

Armature Size: 5.5 ft<sup>2</sup>  
 Number of Units: 8 armatures  
 Material: Hot Rolled Steel  
 Density: 0.29 lbs/cu.in  
 Pods/Armature: 9.5  
 Per Unit Weight: 50.2 lbs.

Material	Width	Thickness	Linear Feet	Volume (cu.in)	Lbs.
Angle Stock	3	0.125	22	99	28.7
Bar Stock	.75	0.125	27.5	61.875	17.9
Inner Angle Stock	1.5	0.125	5.5	12.375	3.6

Spine Length (ave.): 5 ft<sup>2</sup>  
 Material: Poplar  
 Waste: 1.25 ratio  
 Density: 0.0150 lbs/cu.in  
 Pods/Armature: 9.5  
 Pod Weight (ave.): 2.8 lbs.  
 Per Armature Weight: 27.0 lbs.

Material	Length (ft)	Thickness (in)	Width (in)	Qty	Volume (cu.in)	Lbs.
Spine	5	0.75	3		135	2.0
Cleat	1.2	0.75	1	6	54	0.8



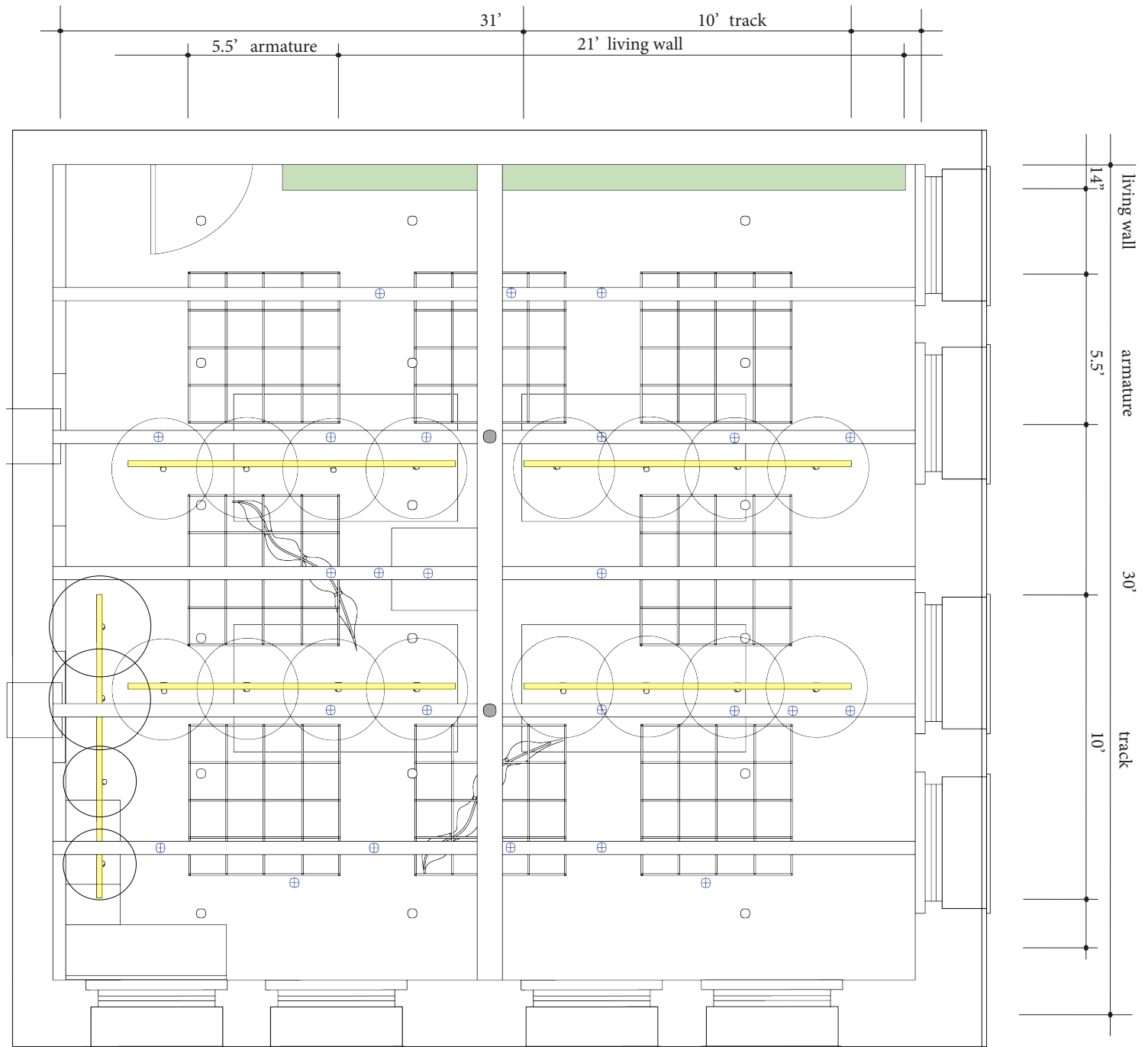
# Biophilic Ceiling Installation

## Ceiling Overlay

Plan overlay illustrating all ceiling elements and dimensions.

### Key

- ⊕ junction box
- sprinkler head
- track lighting
- living wall
- column



# Biophilic Ceiling Installation

## Section Rm. 11



### Lighting Requirements

#### **Classroom - General**

- 30-50 foot candles (FC)
- 300-500 - light level (lux)
- 1.24 - lighting power density (watts per sq. ft.)

#### **Laboratory (Classroom)**

- 50-75 foot candles (FC)
- 500-750 light level (lux)
- 1.43 - lighting power density (watts per sq. ft.)

### Required Lumens

- 930 sq. ft (Rm. 11)
- 37,200 lumens required
- Phillips LED head lamp puts out 1000 lumens each

area (sq. ft.) x lumens (FC) =

$$930 \text{ sq. ft.} \times 40 \text{ FC} = \frac{37,200}{1000 \text{ lm}} = \mathbf{37 \text{ bulbs}}$$

# Biophilic Ceiling Installation

## Primary Lighting

### RISD Interior Lighting Standards

Option E.

Track Lighting:

- i. Track: Lightolier Lytespan
- ii. Track Heads: Lightolier 9021MW
- iii. Track Head Lamp: Solais  
LED LR30LN/40/30K/1000/GY

### Electrical:

- # Circuits: 1
- Amps/Circuit: 20
- Efficiency: 0.7
- Total usable (amps): 14
- LED strip pull (amps): 0.22
- # Pods provided for by 1 LED Strip: 1.6
- # LED Strips allowed per circuit: 64
- # Amps Allowed per transformer: 1.5
- # Pods Allowed per Transformer: 7
- # Pods Provided for (max): 104
- # Pods in Sculpture (estimate): 76

### Standard Lighting

#### I. INTERIOR LIGHTING

##### A. Tubular Fluorescent Lamps:

- i. 4-ft T8: Sylvania FO32/25W/841/XP/SS/ECO3, 4100K (item #22234)
- ii. 4-ft T8: Sylvania FO32/25W/830/XP/SS/ECO3, 3000K (item #22232)
  - for use in Woods Gerry & the Fleet Library
- iii. 4-ft T5: Sylvania FP28/830/ECO, 3000K (item #20868)
  - for use in the Fleet Library
- iv. 3-ft T8: Sylvania FO25/21W/841/XP/SS/ECO3, 4100K (item #22396)
- v. 2-ft T8: Sylvania FO17/15W/841/XP/SS/ECO3, 4100K (item #22407)
- vi. 2-ft T8: Sylvania FO17/830/XP/ECO3, 3000K (item #21785)
  - for use in the Fleet Library
- vii. 2-ft T5: Sylvania FP14/830/ECO, 3000K (item #20907)
  - for use in the Fleet Library
- viii. 2-ft U-lamp: Sylvania FBO25/841XP/SS/6/ECO, 4100K (item #22445)

##### B. Tubular Fluorescent Ballasts:

- i. QUICKTRONIC High Efficiency (QHE) 32 T8 Instant Start Universal Voltage (120-277V)

#### QUICKTRONIC® High Efficiency T8 Systems



#### 32 T8 Instant Start Universal Voltage (120-277V)

Item Number	OSRAM SYLVANIA Description	Input Current (AMPS) @120/277V	Rated Lamp Lumens (lm)	No. of Lamps	Ballast Factor (BF)	Initial System Lumens	Mean System Lumens	Input Power (W) @120/277V	System Efficacy (lm/W) @120/277V	BEF <sup>1</sup>
<b>LOW BALLAST FACTOR</b>										
49837	QHE 1x32T8/UW ISL-SC Ballast Pack	0.21/0.09	F032/0PS 3100	1	0.78	3420	2275	25	97	3.32
49867	10-Pack	0.19/0.08	F028/0P/SS 2725	1	0.78	2125	2000	22	97	3.55
49862	10-Pack	0.19/0.08	F028/0P/SS 2600	1	0.78	2030	1945	22	92	3.55
		0.17/0.08	F032/25W/0P/SS 2475	1	0.78	1930	1815	20	97	3.90
		0.17/0.08	F032/25W/0P/SS 2400	1	0.78	1870	1795	20	94	3.90
49838	QHE 2x32T8/UW ISL-SC Ballast Pack	0.41/0.18	F032/0PS 3100	2	0.78	4835	4545	48	101	1.63
49863	10-Pack	0.35/0.15	F028/0P/SS 2725	2	0.78	4250	3955	42	101	1.86
49864	10-Pack	0.32/0.14	F028/0P/SS 2500	2	0.78	4055	3895	42	97	1.86
		0.32/0.14	F032/25W/0P/SS 2475	2	0.78	3860	3630	38	102	2.05
		0.32/0.14	F032/25W/0P/SS 2400	2	0.78	3745	3595	38	99	2.05
49839	QHE 3x32T8/UW ISL-SC Ballast Pack	0.61/0.27	F032/0PS 3100	3	0.78	7255	6820	73/72	99/101	1.08
49865	10-Pack	0.53/0.23	F028/0P/SS 2725	3	0.78	6380	5955	63	101	1.24
49866	10-Pack	0.48/0.21	F028/0P/SS 2600	3	0.78	6085	5840	63	97	1.24
		0.48/0.21	F032/25W/0P/SS 2475	3	0.78	5790	5445	57	102	1.37
		0.48/0.21	F032/25W/0P/SS 2400	3	0.78	5675	5390	57	99	1.37
49840	QHE 4x32T8/UW ISL-SC Ballast Pack	0.80/0.35	F032/0PS 3100	4	0.78	9670	9090	95	102	0.82
49867	10-Pack	0.71/0.31	F028/0P/SS 2725	4	0.78	8500	7990	84	101	0.93
49868	10-Pack	0.71/0.31	F028/0P/SS 2600	4	0.78	8130	7790	84	97	0.93
		0.62/0.27	F032/25W/0P/SS 2475	4	0.78	7720	7260	76/75	102/103	1.04
		0.62/0.27	F032/25W/0P/SS 2400	4	0.78	7490	7190	76/75	99/100	1.04

##### C. Screw-In A-shape Bulbs (LED):

- i. Philips A-Shape LED: 11A19/END/2700 DIM 6/1
- ii. Philips EnduraLED A19: EnduraLED 12W 2700K A19 Dimm

##### D. Fixtures:

- i. LED Ceiling Downlight: Lithonia Model No. 6BPMW (6" LED Module, 620 lumens, 3000K)
- ii. Dorm Houses: [Home Depot] Commercial Electric 2-Light Brushed Nickel Flushmount [for A-shape LED bulbs]

##### E. Track Lighting:

- i. Track: Lightolier Lytespan
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# Biophilic Ceiling Installation

## Electrical Requirements

### Electrical Requirements

Implementation LED string lights. LED string lights will be 'daisy-chained' to the power limitation of the transformer.

Our working prototype transformer takes in 120V and 1.6amp, and outputs 12V and 3amp.

Primary lighting will operate on a circuit independent of the installation.

### Installation:

Pod forms will be fixed individually to a given armature. Each individual armature will be conveniently detached for ceiling access.

### RISD Interior Lighting Standards

Option for Extension Wand for Track Lightolier Lytespan. See page 7. Sizes 18", 24", 32" (and custom)



CIT Rm. #103

## Biophilic Ceiling Installation

### Lighting and Materials Schedule

#### RISD Interior Lighting Standards

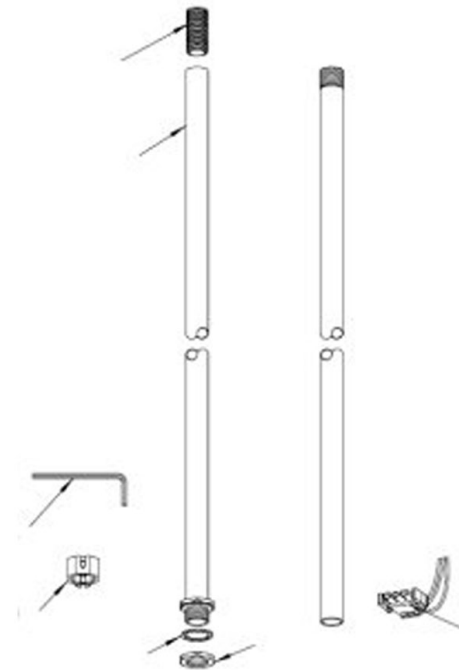
Option for Extension Wand for Track Lightolier Lytespan. Sizes 18", 24", 32" (and custom).

Lytespot Extension Wand 6074 (image)

The Lytespot Extension Wand could be implemented to avoid any obstructions of the track LED lighting. The extension wand will drop from the track to lower the lamps a few inches below the base of our installation.



Lightolier Lytespot Extension Wand 6074, 18"







Lytespot Extension Wand Diagram



# Biophilic Ceiling Installation

## Lighting and Materials Schedule

### LIGHTING SCHEDULE

TYPE	SOURCE	DESCRIPTION	REMARKS	IMAGE
Pod	LED	16.4 LED Flexible Light Strip (white)	12V DC, 300 Units SMD 2835 LED	
Pod	LED	LED Power Adapter Transformers	12V DC, 3A Max, 36 Watt Max, UL Listed	
Pod	LED	LED Connector	12V	
Armature	GALVANIZED PANEL	Mount for 3/8 in. threaded rod	3/8 IN	
Armature	LOCK NUT	Nut with a nylon collar insert that resists turning	M10	
Armature/Pod	WASHER	Zinc-Plated Cut Washer	To fit 3/8 IN Threaded Rod	
Armature/Pod	BOLT NUT	A563 Grade A	To fit 3/8 IN Threaded Rod	
Armature/Pod	SPLIT WASHER	Variable	Variable	
Armature	FULL THREADED ROD / REVERSE THREADED ROD	Galvanized Threaded Electrical Support Rod	3/8 IN	
Armature	TURNBUCKLE	Grade 316 stainless steel, maximum corrosion resistance	Variable	
Safety	AIRCRAFT CABLE	Galvanized Cable Reel	3/8 IN	

# Biophilic Ceiling Installation

Interior view (screenshot)

