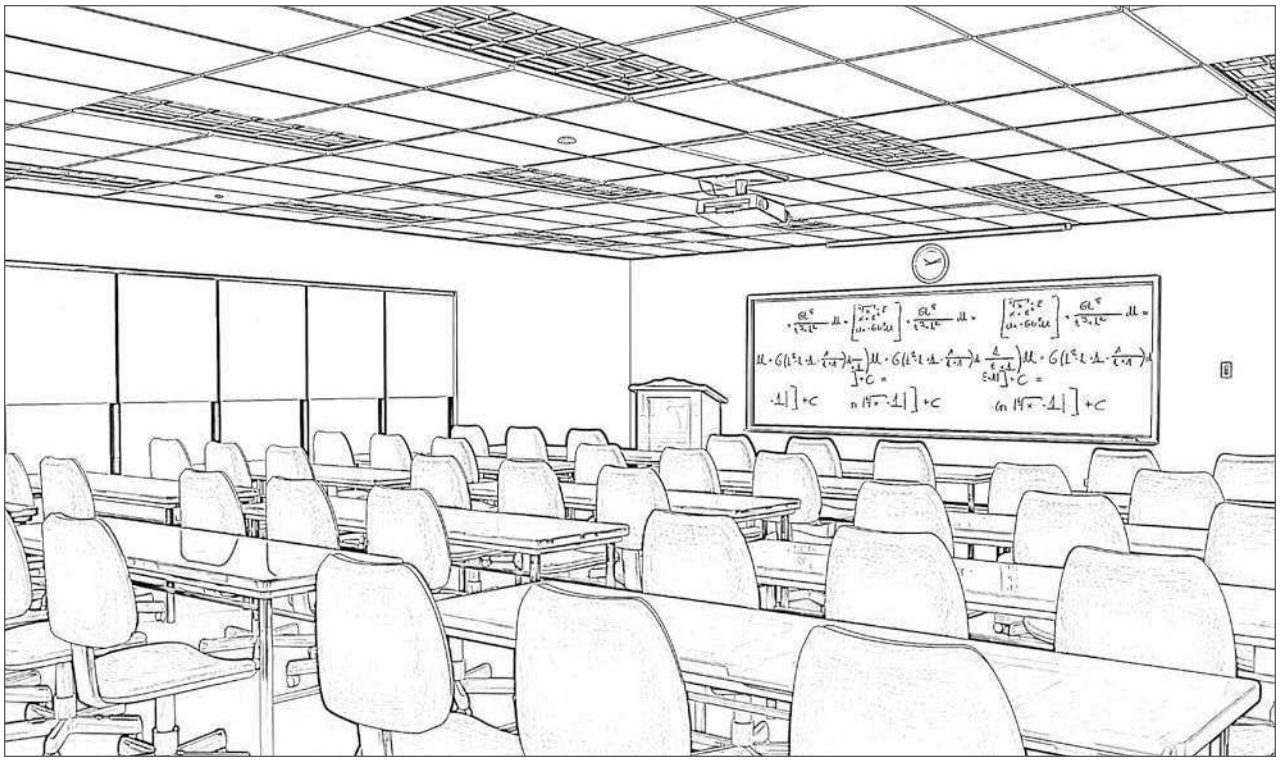
Light control solutions

Classrooms



Total Light Management™ in classrooms

Classrooms are multifunctional spaces that benefit from various lighting scenes, enable video presentations, and support new teaching methods.

The challenge: Enhance the learning environment by creating unique lighting scenes for different activities. Control multiple zones of light to reduce lighting energy costs.

The opportunity: Utilize energy-saving light control strategies, to enhance the quality of light and reduce costs.

Functions:

- Classroom instruction
- Video presentations
- Use of whiteboards, electronic smart boards, and computers

Requirements:

- Meet energy code requirement for automatic shut-off
- Provide multiple preset lighting conditions
- Control at entry door and teacher station
- Comply with ASHRAE/IES 90.1 -2007 Lighting Power Density (LPD) requirements of 1.24 W/ sq. ft.
- Comply with CHPS and LEED requirements

LUTRON®

save energy with Lutron™ ®

Classroom examples

	Control functionality	Basic - multi-level switching	Basic - multi-level dimming with daylighting	
Define the space	**Activities**	• Classroom instruction • Video presentations	• Classroom instruction • Video presentations	
	Typical interior finish level	Basic finish level	Basic finish level	
	Lights and shades - Zones - Fixture types	**2 switched lighting zones** • Recessed parabolic fluorescent	**2 dimmed lighting zones** • Recessed direct/indirect fixture	
Light control strategies	**Code-required strategies**	Occupancy sensor	• Occupancy sensor • Daylight sensor	
	Additional strategies	n/a	n/a	

Note: Use the Lutron® PowPak™ CCO module to integrate Radio Powr Savr™ sensors with HVAC and other building system, and to maximize energy savings.

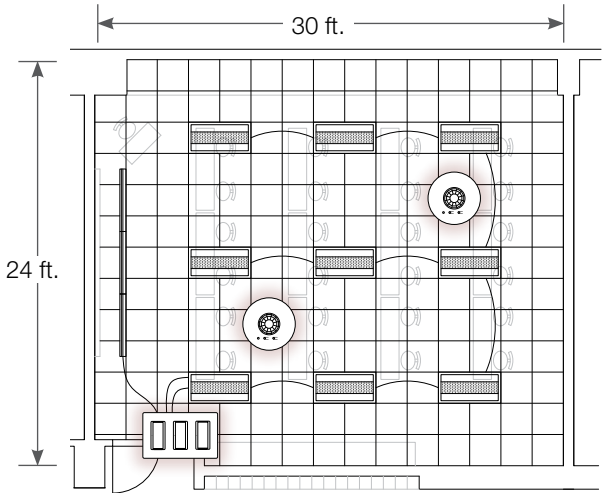
	Intermediate	Advanced
	• Classroom instruction • Video presentations	Classroom with permanent AV equipment and computer stations
	Intermediate finish level	High-end finish level
	3 dimmed lighting zones • Pendant linear fluorescent • Linear whiteboard fixture	**6 dimmed lighting zones** • Pendant linear fluorescent fixture • Linear whiteboard fixture • Plug-in load control (computer monitors) **1 shade zone** • Blackout shades
	• Occupancy sensor • Daylight sensor	• Occupancy sensor • Daylight sensor
	• Preset scenes • 1% fluorescent dimming	• Preset scenes • 1% fluorescent dimming • AV integration • Shades

Basic classroom - multi-level switching

Interior space classroom for general use. Incorporates a recessed fluorescent lighting system plus whiteboard lighting.

Control strategies:

- Occupancy sensing
- Switched fluorescent lighting



Controls not to scale with reflected ceiling plan

Key	
(+)*	2x4, 2-lamp 32W T8 recessed direct/indirect - with bi-level switching ballast
(+)*	Recessed linear whiteboard 32W T8 - with switching ballast
	Maestro Wireless® switch with 3-gang Claro® wallplate
	Radio Powr Savr™ wireless, ceiling-mount, occupancy sensor

* Not shown in reflected ceiling plan

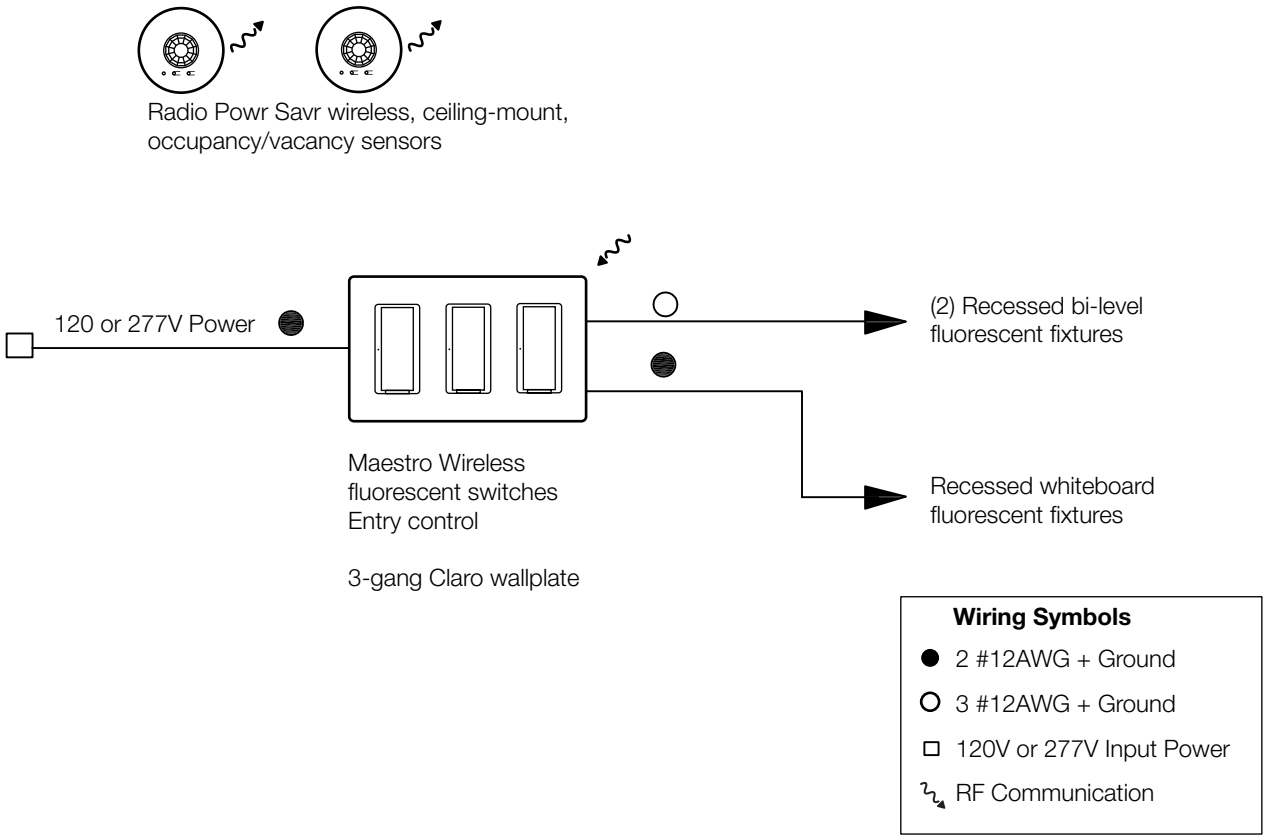
Maestro Wireless switch

- Easy to operate
- Installs in as little as 15 minutes
- Allows control of up to 10 sensors and wireless controls

Radio Powr Savr wireless, ceiling-mount, occupancy sensor

- Installs in as little as 15 minutes
- Communicates with compatible Lutron® dimmers, switches and light control systems
- Uses reliable Clear Connect™ Radio Frequency (RF) Technology, which ensures smooth, consistent performance

One-line diagram:



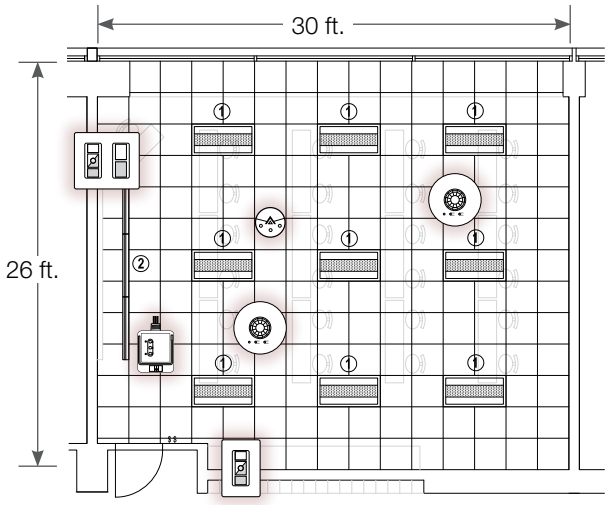
Bill of materials		
Control	**Qty.**	**Description**
MRF2-8S-DV-WH	3	Maestro Wireless fluorescent switch
LRF2-OCR2B-P-WH	2	Radio Powr Savr wireless, ceiling-mount, occupancy sensor
CW-3-WH	1	3-gang Claro wallplate
Materials cost (suggested list price, labor not included) = $585.00		

Basic classroom - dimming with daylighting

Perimeter classroom for general use, incorporating recessed fluorescent lighting plus whiteboard lighting.

Control strategies:

- Occupancy sensing
- Preset, dimmed fluorescent lighting
- Daylight sensing



Controls not to scale with reflected ceiling plan
① Indicates control zone

Key	
(+)*	2x4, 2-lamp 32W T8 recessed indirect - with EcoSystem® H-Series ballast
(+)*	Recessed linear whiteboard 32W T8 - with EcoSystem H-Series ballast
**	PowPak™ dimming module with EcoSystem
	Pico wireless controls with 1-gang and 2-gang Claro® wallplate
	Radio Powr Savr™ wireless, ceiling-mount, occupancy sensor
	Radio Powr Savr wireless daylight sensor

* Not shown in reflected ceiling plan
** Located above ceiling

Pico wireless control

- Provides wireless dimming control of lighting loads; communicates with PowPak dimming module with EcoSystem

PowPak dimming module with EcoSystem

- Allows connected lighting loads to be dimmed in response to wireless occupancy/vacancy sensors, daylight sensors, and Pico controls

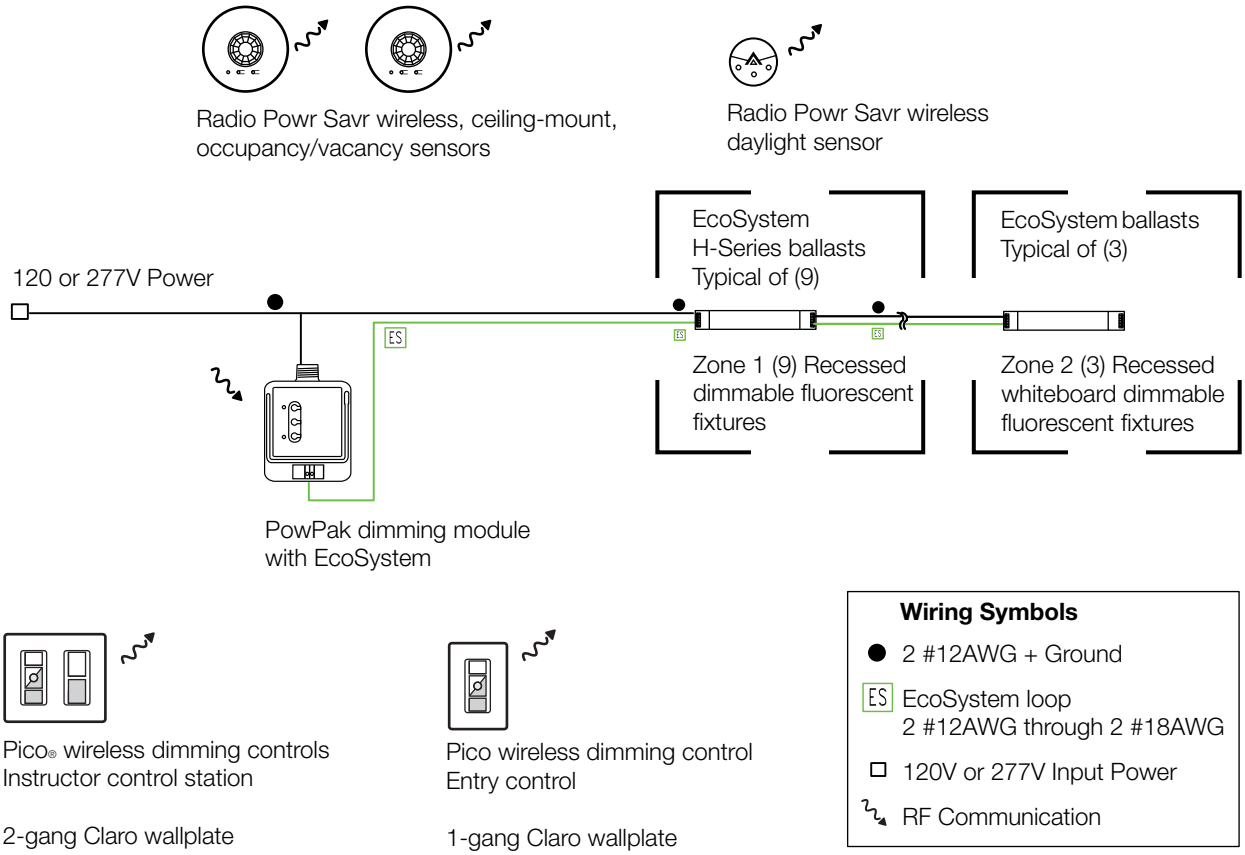
Radio Powr Savr wireless, ceiling-mount, occupancy sensor

- Installs in as little as 15 minutes
- Communicates with compatible Lutron® dimmers, switches and light control systems
- Uses reliable Clear Connect™ Radio Frequency (RF) Technology, which ensures smooth, consistent performance

Radio Powr Savr wireless daylight sensor

- Allows connected dimmers, switches, and lighting control systems to automatically adjust light level based on available daylight

One-line diagram:



Bill of materials		
Control	**Qty.**	**Description**
RMJ-ECO32-DV-B	1	PowPak dimming module with EcoSystem
MRF2-3BRL-L-WH	2	Pico wireless controls
LRF2-OCR2B-P-WH	2	Radio Powr Savr wireless, ceiling-mount, occupancy sensor
LRF2-DCRB-WH	1	Radio Powr Savr wireless, ceiling-mount, daylight sensor
EHD T832 C U 2 10	9	EcoSystem dimming H-Series ballast - (2) T8 lamps[1]
EHD T832 C U 1 10	3	EcoSystem dimming H-Series ballast - (1) T8 lamp[1]
CW-1-WH	1	1-gang Claro wallplate
CW-2-WH	1	2-gang Claro wallplate
Materials cost (suggested list price, labor not included) = $1,534.70		

1 Ballasts typically purchased with fixtures. Price does not include cost of fixtures.

Intermediate classroom

Perimeter classroom for general use. Incorporates linear pendant fluorescent lighting with independent uplight and downlight, plus recessed whiteboard lighting.

Control strategies:

- Occupancy sensing
- Preset, dimmed fluorescent lighting
- Daylight sensing

Pico® wireless controls

- Provides wireless dimming control of lighting loads; communicates with PowPak™ dimming module with EcoSystem®

PowPak dimming module with EcoSystem

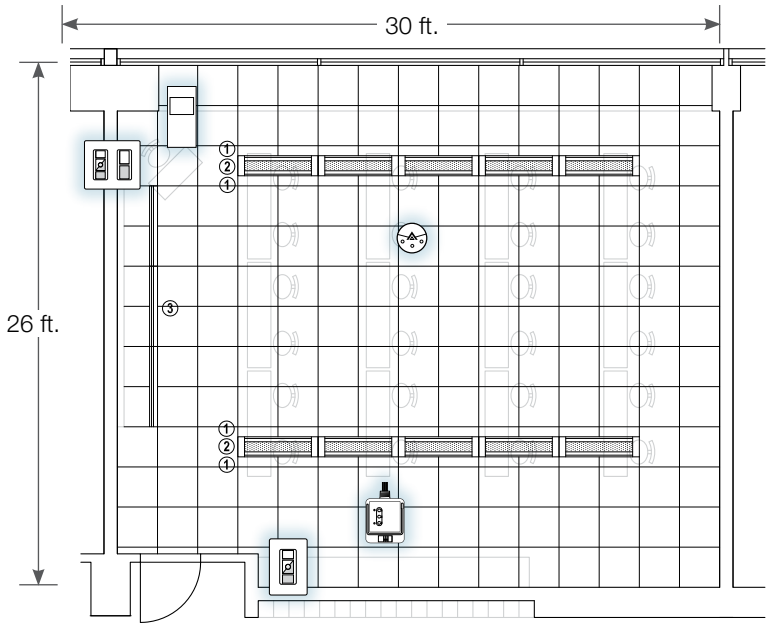
- Allows connected lighting loads to be dimming in response to wireless occupancy/vacancy sensors, daylight sensors, and Pico controls

Radio Powr Savr™ wireless, corner-mount, occupancy sensor

- Installs in as little as 15 minutes
- Communicates with compatible Lutron® dimmers, switches and light control systems
- Uses reliable Clear Connect™ Radio Frequency (RF) Technology, which ensures smooth, consistent performance

Radio Powr Savr wireless daylight sensor

- Allows connected dimmers, switches, and lighting control systems to automatically adjust light level based on available daylight
- Uses reliable Clear Connect™ Radio Frequency (RF) Technology, which ensures smooth, consistent performance



Controls not to scale with reflected ceiling plan

① Indicates control zone

Key	
(+)*	2/1 32W T8 pendant linear independent uplight/downlight - with EcoSystem H-Series dimming ballast
(+)*	Recessed linear whiteboard 32W T8 - with EcoSystem H-Series dimming ballast
**	PowPak dimming module with EcoSystem
	Pico wireless controls with 1-gang and 2-gang Claro® wallplate
	Radio Powr Savr™ wireless, corner-mount, occupancy sensor
	Radio Powr Savr wireless daylight sensor

* Not shown in reflected ceiling plan

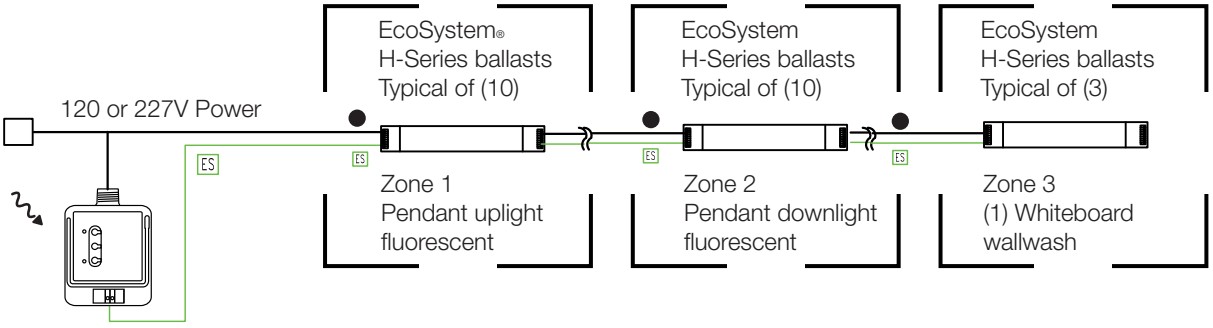
** Located above ceiling

Intermediate classroom

One-line diagram:

Radio Powr Savr™ wireless, corner-mount,occupancy/vacancy sensor

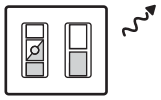
Radio Powr Savr wireless daylight sensor



PowPak™ dimming module with EcoSystem

Wiring Symbols

- 2 #12AWG + Ground
- ES EcoSystem loop 2 #12AWG through 2 #18AWG
- Input Power
- RF Communication



Pico® wireless dimming controls
Instructor control station

2-gang Claro® wallplate

Pico wireless dimming control
Entry control

1-gang Claro wallplate

Bill of materials		
Control	**Qty.**	**Description**
RMJ-ECO32-DV-B	1	PowPak dimming module with EcoSystem
MRF2-3BRL-L-WH	2	Pico wireless controls
MRF2-2B-L-WH	1	Pico wireless control
LRF2-OKLB-P-WH	2	Radio Powr Savr wireless, corner-mount, occupancy sensor
LRF2-DCRB-WH	1	Radio Powr Savr wireless daylight sensor
EHD T832 C U 2 10	10	EcoSystem H-Series fluorescent dimming ballast - (2) T8 lamps[1]
EHD T832 C U 1 10	13	EcoSystem H-Series fluorescent dimming ballast - (1) T8 lamp[1]
CW-2-WH	1	2-gang Claro wallplate
CW-1-WH	1	1-gang Claro wallplate
Materials cost (suggested list price, labor not included) = $2,419.70		

1 Ballasts typically purchased with fixtures.

Advanced classroom and computer lab

Perimeter computer lab for computer training. Incorporates linear pendant fluorescent lighting with independent uplight and downlight, plus recessed whiteboard lighting and shade control.

Control strategies:

- Occupancy sensing
- Daylight harvesting
- Preset, dimmed fluorescent
- Blackout shades

Pico® wireless controls

- Provides wireless dimming control of lighting loads; communicates with Energi Savr Node™ with EcoSystem® and shades

Energi Savr Node with EcoSystem and shades

- Allows easy integration of sensors, lighting fixtures with digital ballasts, dimming and switching loads
- Can also integrate with other building systems

Sivoia® QS Wireless shades

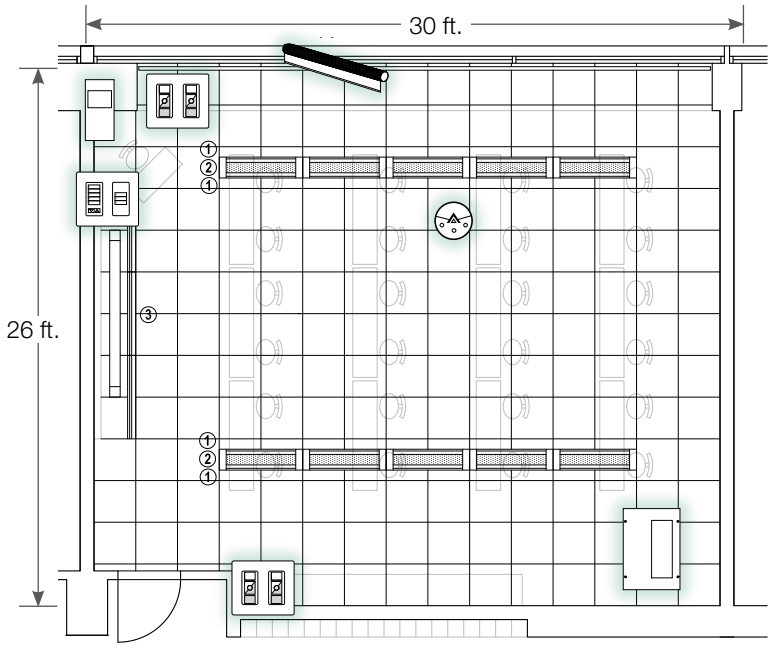
- Ultra-quiet control of daylight at the touch of a button

Radio Powr Savr™ wireless, wall-mount, occupancy/vacancy sensor

- Installs in as little as 15 minutes
- Communicates with compatible Lutron® dimmers, switches and light control systems
- Uses reliable Clear Connect™ Radio Frequency (RF) Technology, which ensures smooth, consistent performance

Radio Powr Savr wireless daylight sensor

- Allows connected dimmers, switches, and lighting control systems to automatically adjust light level based on available daylight



Controls not to scale with reflected ceiling plan

① Indicates control zone

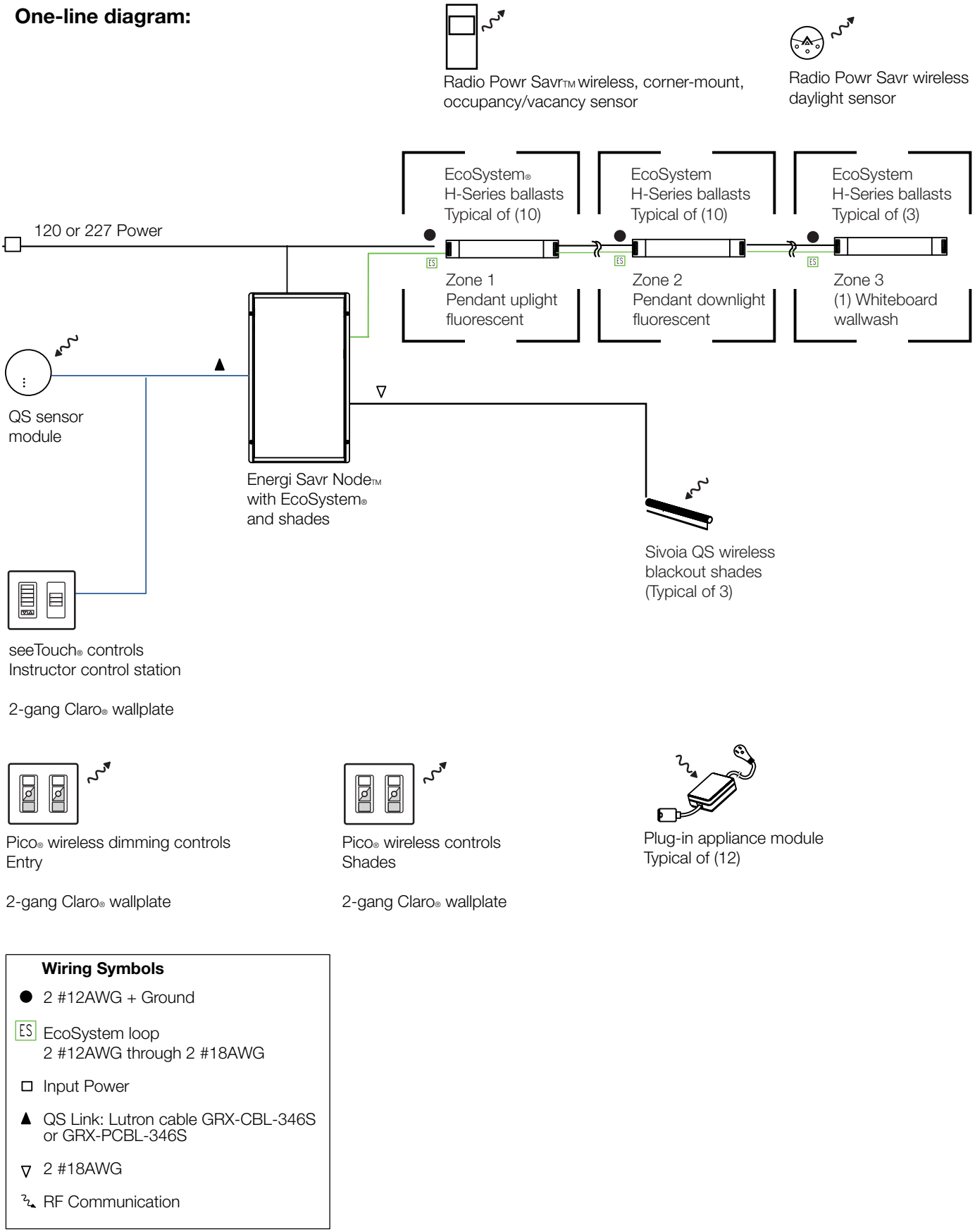
Key	
(+)*	2/1 32W T8 pendant linear independent uplight/downlight - with EcoSystem H-Series dimming ballast
(+)*	Recessed linear whiteboard 32W T8 - with EcoSystem H-Series dimming ballast
	seeTouch control for instructor control location
	Pico wireless controls with 2-gang Claro® wallplates
*	QS Sensor module
	Sivoia QS Wireless shades
	Radio Powr Savr wireless, wall-mount, occupancy sensor
	Radio Powr Savr wireless ceiling-mount daylight sensor
**	Energi Savr Node with EcoSystem and shades
*	Plug-in appliance module

* Not shown in reflected ceiling plan

** Located above ceiling

Advanced classroom and computer lab

One-line diagram:



Wiring Symbols

- ● 2 #12AWG + Ground
- ES EcoSystem loop 2 #12AWG through 2 #18AWG
- □ Input Power
- ▲ QS Link: Lutron cable GRX-CBL-346S or GRX-PCBL-346S
- ▽ 2 #18AWG
- RF Communication

Bill of materials		
Control	**Qty.**	**Description**
MRF2-3BRL-L-WH	2	Pico wireless controls
QSR4P-3R-WH-E09	2	Pico wireless controls for shades
QSWS2-5BRLI-WH	1	seeTouch instructor control station
QSWS2-2BRLI-WH	1	
CW-2-WH	1	
QSN-2ECO-PS120	1	Energi Savr Node with EcoSystem and shades
LRF2-OKLB-P-WH	2	Radio Powr Savr wireless, corner-mount, occupancy sensor
LRF2-DCRB-WH	1	Radio Powr Savr wireless, ceiling-mount, daylight sensor
QSM2-4W-C	1	QSM Sensor module
CW-2-WH	2	Claro 2-gang wallplate
MRF2-15APS-1-WH	12	Plug-in appliance modules
EHD T832 C U 2 10	10	EcoSystem H-Series fluorescent dimming ballast - (2) T8 lamps[1]
EHD T832 C U 1 10	13	EcoSystem H-Series fluorescent dimming ballast - (1) T8 lamp[1]
–	–	Sivoia QS Wireless blackout shades[2]
Materials cost: Contact Lutron for pricing		

1 Ballasts typically purchased with fixtures. Price does not include cost of fixtures.

2 Contact Lutron Representative for shades model numbers and pricing.