Today’s Agenda

1. Review Updated Site Plan
2. Review and Approve OPR
3. Review MEP Systems
4. Review Progress Energy Model
Review Updated Site Plan
Site Plan
Site Plan
Pedestrian Level Light Fixture
Harvard Yard
Seating
Review and Approve OPR
Review MEP Systems
HVAC

- Classroom HVAC System
- Large Room HVAC System
- Rooftop and Ground Mounted Equipment
- Building Control System
HVAC System
VRF Fan Coils with Variable Volume Ventilation
HVAC System
Classroom Layout

Fan Coil Unit
VAV Box
Thermostat
HVAC System
Rooftop Energy Recovery Ventilation
HVAC System
Large Space Rooftop Units
Roof and Ground Mounted Equipment Plan
HVAC System
Building Controls

Control System Architecture

Thermostat
CO₂ Sensor
Electrical

- Proposed Classroom Lighting Design Concepts.
- Proposed Typical Classroom Lighting Control Concept.
- Proposed “Plug Loads” Control Concept: “Controlled” Receptacles vs. “Uncontrolled”
Classroom Lighting Design – Options and Selection

Pendant-mounted LED linear lighting fixtures with Indirect/Direct light distribution.

- Number of light engines.
- Light Output options.
- Optic options.
- Indirect/direct light distribution ratios.

**OPTIC & DISTRIBUTION RATIO OPTIONS**

- Open
- Frosted Top Optic (FTO)
- Clear Top Optic (CTO)

**Distribution Ratios**

- 10%/90%/70%
- 20%/80%/60%

**Total Direct Optic (TDO)**

- 10%
- 20%
- 30%
- 40%
Classroom Lighting Design – World Language B113
(Room Area 1005 SF)

Pendant-mounted LED linear lighting fixtures with Indirect/Direct light distribution. Selected options:

- 2 light engines, “H” output option, I/D, 20%UP/80%DOWN

RESULTS:
Average Illuminance: 30 fc
LPD: .57 W/ft²
Classroom Lighting Design – Kindergarten S108
(Room Area: 1097 SF)

Pendant-mounted LED linear lighting fixtures with Indirect/Direct light distribution. Selected options:

- 2 light engines, “V” output option, I/D, 20%UP/80%DOWN

RESULTS:
Average Illuminance: 30 fc
LPD: .64 W/ft²
Digital Networked Lighting Control System

- Compliant with the latest IECC and ASHRAE 90.1-2016.
- Conducting lighting systems energy consumption reports by date range, room, or timely period.
- Integration with Building Management System (DDC) and reporting each lighting control system component ON/OFF status.
- Gateway communication protocols: BACNet, Modbus, LonWorks, Matasys. Smartphone and tablet compatible.
- Wireless communication between room lights, daylight sensors, occupancy sensors and lighting control devices. No wires or conduits are necessary for wall-mounted lighting control switches. Long-life built-in batteries.
Electrical Systems

Lighting System

Digital Networked Lighting Control System

- Lighting Fixtures
- Luminaire Controllers
- Wireless Lighting Control Stations
- Wireless Daylight and Occupancy Sensors
- Gateways

The GW-1100 Wireless Gateway by IDEAL® is an electronic communications device which acts as the central processing “hub” of the Audacy system. The GW-1100 wirelessly receives and prioritizes inputs from sensors, switches and/or the Audacy Interface (e.g., website or app). It then communicates wirelessly with each Luminaire Controller to turn on, turn off or dim light fixtures, or control plug loads based on input from the systems above. The GW-1100 can also pass information such as light fixture status, sensor data, and energy usage to the Audacy Interface.

The SCD-1000 external-mounted Luminaire Controller by IDEAL® is an AC-powered, wireless lighting control device that is part of the Audacy® Wireless Controls system. Operating in the highly reliable 915 MHz spectrum, the SCD-1000 is a junction box insert module that can turn on, turn off or provide a 0-10V dimming signal to an electronic dimming ballast or LED driver. The SCD-1000 quickly and easily installs using a knock-out on a junction box or fixture and provides the ability to control individual fixtures or groups of fixtures if desired. The Audacy Wireless Controls system can be used to provide compliance with ASHRAE 90.1-2010 and CA Title 24 requirements.
Classrooms Lighting Control Design

Typical Classroom Control Stations TM + TCC

- **TM** – TEACHER MASTER control station
  Located at the entrance door
  Wireless installation
  Turns ON/OFF all classrooms lights

- **TCC** – TEACHER CONTROL CENTER
  Located at the teacher desk
  Wireless installation
  Selects “Lighting Scenes”
  - General lighting mode
  - A/V lighting mode
  - Reduced lighting mode
  - Spare
  Manual dimming and OFF
Plug Load Control System Concept

- Basis of Design: Audacy Wireless Plug Load Controller – an AC-powered wireless receptacle device, connected wirelessly to room occupancy sensor or scheduled to turn ON/OFF via Audacy Interface. Does not consume electricity when room is vacant.

- One Plug Load Controller controls individual receptacles or a group of devices on one common circuit.

- In compliance with NEC, all “automatically controlled” receptacles shall be permanently marked with standard “power” symbol defined by NEC.
Plumbing & Fire Protection

- Plumbing Fixtures
- Domestic Water Service
- Domestic Hot Water System
- Sanitary and Kitchen Waste System
- Storm Drainage System
- Natural Gas System (for Science Rooms only)
- Sprinkler System
Student/Staff Fixtures

- Water Closets – 1.28 GPF
- Flush Valves – Automatic (Solar/Battery Powered)
- Urinals – 0.25 GPF
- Lavatory Faucets – 0.5 GPM (Solar/Battery Powered)
- Drinking Fountains
- Emergency Showers/Eyewashes
Plumbing Systems

Domestic Cold Water System

Booster Pump

Domestic Hot Water System
Plumbing Systems

• Roof Drainage System:

• Specialty Systems:
  ◦ Kitchen Waste System (Kitchen Interior and Exterior Grease Traps)
Fire Protection

- Fully Sprinklered

- Fire Pump
  - Hydrant Flow Test

NFPA Compliant Sprinkler System
Review Progress Energy Model Update
Energy Use Intensity Distribution (kBtu/SF/Yr)

- Hot water: 3.15
- Heating & Cooling: 10.90
- Fans: 1.56
- Kitchen load: 1.42
- Lighting: 2.04
- Misc load (plug): 4.32

pEUI: 23.39
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<td>Hot water</td>
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<td>Heating &amp; Cooling</td>
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<td>4.32</td>
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Total Predicted Electrical Use = 1,130,516 kWh
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<th>Value</th>
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<td><strong>Predicted Energy Use</strong></td>
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<tr>
<td>Predicted Electrical Use</td>
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<td>Predicted Electrical Use (with 20% contingency)</td>
<td>1,356,619 (kWh)</td>
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Thank you