0921 Light Fixtures & Controls – Fixtures, controls, conduit, wiring, etc.

Description of the building system
Classroom corridors: Corridors in the classroom wings of the 1956 and 1965 areas of the school are illuminated with 2x4 troffers with acrylic lenses and (2) F32T8 lamps. These fixtures are recess mounted in grid ceilings.

Main corridor: The main corridor with the high ceiling, near the library is illuminated with 2x4 troffers with acrylic lenses and (4) F40T12 lamps. These fixtures are recess mounted in grid ceilings.

Main corridor: The main corridor with the low ceiling, leading to the multipurpose space is illuminated with a cove on each side of the corridor. These cove lights utilize (2) F40T12 lamps in a staggered configuration. The fixture housing is equipped with a louver system.

Foyer: Each entrance to the school is illuminated with (2) lensed, recessed, 1x1 fixtures. This design philosophy was first employed in 1956, and was continued at the 1965 addition for consistency. The one exception is the entrance near the boiler room, which is illuminated with cove-mounted lighting.

Trophy cases: The trophy cases are illuminated with F40T12 lamps mounted in a basic housing with an asymmetric reflector system.

Classrooms: Typical classroom lighting consists of (9) 2x4 troffers with acrylic lenses and (4) F40T12 lamps per fixture. The fixtures are switched in 3-rows from the interior wall to the exterior wall. This is an effective switching scheme, considering the exterior wall provides considerable daylight during periods of the day.

Multipurpose room: Illumination is provided by 400 watt metal halide high bay fixtures. The fixtures are equipped with flat lenses to protect the lamps.

Library: The primary lighting consists of large, indirect, pendant mounted bowls with a 400 watt metal halide lamp. Incandescent cylinders are installed through the wooden grid system between the main library space and circulation. The cylinders appear to have an R30 type lamp in the 70 watt range. Recessed, 2x4, parabolic troffers were utilized in the back circulation area with (3) F32T8 lamps.

Main fan room: Industrial fixtures with wire guards and (3) F40T12 lamps were utilized in the fan room.

Miscellaneous spaces 1956 and 1965: Within the 1956 and 1965, utility type spaces like the toilets, storage rooms, and equipment rooms have, for the most part, the original light
fixtures. Exceptions occur when fixtures have failed and were replaced as part of regular maintenance.

Miscellaneous spaces 1991: In the area west of the main entry, beyond the high main entry corridor, some of the lighting was replaced in the utility type spaces. This includes mostly the kitchen and storage spaces. Fluorescent fixtures were introduced into these spaces with F40T12 lamps. The fixtures are in good condition.

Egress lighting: The main corridor with the low ceiling, and the toilets are equipped with emergency lighting units, commonly known a ‘bug-eyes’. The multipurpose area has wall mounted self powered units. The classroom corridor system has distributed battery units integral to the 2x4 recessed troffers.

Controls: Spaces are controlled with traditional hard-wired switches. All lighting circuits route through lighting contactors typically located near panel-board, above the ceiling. The coils of these contactors are driven by the building management system allowing for remote control of the lights from the maintenance office.

**Condition of the building system**

Classroom corridors: These troffers were replaced since the original construction and are in good condition.
Remaining life expectancy: 20 years.

Main corridor (high-bay): The 1956 drawings specified a luminous sphere for this space. Those fixtures were likely replaced with the present troffers some years back. Light levels through this portion of the corridor system are low, due to the inefficiency of the fixtures and possibly a change to the floor finish. The present gray floor does not provide much reflectance. We recommend replacement with a different type of lighting system, such as pendant-mounted bowls. This would allow for increased light levels and add a much needed aesthetic appeal to this high space.
Remaining life expectancy: 5 years.

Main corridor (low-bay): The light levels through this portion of the corridor system are a bit low. The fixtures are inefficient. Replacement is recommended.
Remaining life expectancy: 10 years.

Foyer: The effectiveness of these fixtures is dependent upon ceiling height. At the main entry, for instance, very little illumination actually reaches the walking surface. The fixtures are original and inefficient. The lenses are deteriorated, further reducing the amount of illumination. Replacement is recommended.
Remaining life expectancy: 0 years.

Trophy cases: These fixtures are original and inefficient. One of the reflectors is missing, exposing the bare lamp to viewers. Replacement is recommended.
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Remaining life expectancy: 0 years.

Classrooms: It is not clear when the classroom lighting was installed. The 1956 and 1965 drawings specify a pendant mounted schoolhouse style fixture. A substitution may have occurred, but it is more likely the original fixtures were replaced some time ago with the present troffer system. In any case, the lighting system is outdated and inefficient. Replacement is recommended.
Remainig life expectancy: 5 years.

Multipurpose room: This lighting system was installed in 1991. The fixture housings and support systems are in good condition. A few lamps have obvious color shift, which suggests they are reaching the end of their life. A couple of the ballasts are quite loud, and may require replacement in the near future. These are considered regular maintenance issues to be tackled as time permits, or when failure occurs.
Remaining life expectancy: 20 years.

Library: The primary lighting in the library was installed in 1991. The 1991 drawings do not detail the wooden grid, or the acoustic ceiling in the circulation area. We suspect this construction and fixture installation occurred in the last ten years, particularly since the parabolic troffers have F32T8 lamps. All of the lighting is in good condition.
Remaining life expectancy: 20 years.

Main fan room: The fixtures in the fan room were installed in 1991. The fixtures are in good condition, but the lamps are inefficient. The light switch is located on the ductwork in the fan room, which is very inconvenient. One has to climb the ladder and crawl into the space before reaching the light switch. We recommend replacing the inefficient fixtures and relocating the light switch to the space below.
Remaining life expectancy: 20 years.

Miscellaneous spaces 1956 and 1965: These lighting systems are outdated, inefficient, and in many cases damaged. Replacement is recommended.
Remaining life expectancy: 0 years.

Miscellaneous spaces 1991: Although these fixtures are in good condition, the lamps are inefficient. Replacement is recommended.
Remaining life expectancy: 20 years.

Egress lighting: Egress lighting throughout the facility is very limited. Fixtures that are installed do not comply with current International Building Code requirements of a minimum of 1 foot-candle along the path of egress. Replacement is recommended.
Remaining life expectancy: 10 years.

Controls: The hard wired switches are due for replacement as fixture replacement occurs. The lighting contactors are in good condition.
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Remaining life expectancy:  Switches, varies 5 to 20 years.  Contactors, 20 years.

Deficiency

0921-1 Replace lighting system in high portion of main corridor
Light levels through this portion of the corridor system are low due to the inefficiency of the fixtures and because the present gray floor finish does not provide much reflectance.

Deficiency category:  RR, E

Remedy
Replace with a different type of lighting system, such as pendant-mounted bowls. This would allow for increased light levels and add a much needed aesthetic appeal to this high space.

Estimated Construction Cost:  $12,000
Deficiency

0921-2 Replace lighting system in low portion of main corridor
The light levels through this portion of the corridor system are a bit low. The fixtures are inefficient.

Deficiency category: E, F

Remedy
A similar, more energy efficient cove type system could be developed here, supplemented by a handful of recessed compact fluorescent down lights. Provide new wiring and conduit.

Estimated Construction Cost: $14,000
Deficiency

0921-3 Replace lighting at entries
The fixtures are original, inefficient, do not provide sufficient illumination, and have exceeded their service life. The lenses are deteriorated, further reducing the amount of illumination. The effectiveness of these fixtures is dependent upon ceiling height. At the main entry, for instance, very little illumination actually reaches the walking surface.

Deficiency category: RR, E

Remedy
Because it is so high, recessed metal halide downlights with a 6-inch aperture would work well at the main entry. We could locate three in the space with the outer two grazing light down the wall on the ends of the entry. The entries with low, lay-in-grid ceilings can be illuminated with coves at the edges and a cluster of downlights, similar to our suggestion for deficiency 0921-2. Provide new wiring and conduit.

Estimated Construction Cost: $27,000
0921-4 Replace lighting in trophy cases
These fixtures are original, inefficient, and past their service life. One of the reflectors is missing, exposing the bare lamp to viewers.

Deficiency category: RR, E

Remedy
This is a great application for T5 lamps in a simple housing with an asymmetric reflector system. The fixtures could be hidden from sight a little better since they would be about half the profile of the present fixtures. Provide new wiring and conduit.

Estimated Construction Cost: $4,200
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Deficiency

0921-5 Replace classroom lighting
The age of the present troffer system is not known. The lighting system is outdated and inefficient.

Deficiency category: RR, E

Remedy
High ceilings exist in the classrooms that will allow use of a pendant mounted linear indirect/direct lighting system. Provide new wiring and conduit.

Estimated Construction Cost: $163,000
0921-6 Replace lighting in main fan room
The fixtures in the fan room were installed in 1991. The fixtures are in good condition, but the lamps are inefficient. The light switch is located on the ductwork in the fan room, which is very inconvenient. One has to climb the ladder and crawl into the space before reaching the light switch.

Deficiency category: E

Remedy
Replace with similar style fixtures with T8 lamps and electronic ballasts. Relocate the light switch to the space below.

Estimated Construction Cost: $1,200
Deficiency

0921-7 Replace lighting in miscellaneous spaces 1956 and 1965
These original lighting systems are outdated, inefficient, in many cases damaged, and past their service life.

Deficiency category: RR, E

Remedy
These areas need to be treated on a case-by-case basis as ceiling types and heights vary. Recessed troffers, and surface mounted commercial products will work fine for most applications. Provide new wiring and conduit.

Estimated Construction Cost: $13,000
Deficiency

0921-8 Replace lighting in miscellaneous spaces 1991
Although these fixtures are in good condition, the lamps are inefficient.

Deficiency category: E

Remedy
These areas need to be treated on a case-by-case basis as ceiling types and heights vary. Most of these spaces are utility in nature with open or lay-in-grid ceilings. Recessed troffers, and surface mounted commercial products will also work fine in most of these applications. Provide new wiring and conduit as necessary.

Estimated Construction Cost: $11,000
0921-9  Supplement egress lighting
Egress lighting throughout the facility is very limited. Fixtures that are installed do not comply with current International Building Code requirements of a minimum of 1 foot-candle along the path of egress.

Deficiency category:  C:  UBC Section 1006

Remedy
In areas where lighting is upgraded, egress lighting will need to be considered and dovetailed into the installation. This lighting will probably take a few forms. A supplemental system is required in multipurpose. Portions of the main corridor can utilize bug-eye style units. Other areas will likely have distributed batteries within the normal lighting fixture. The classroom corridor system is the only area that does not need immediate attention.

Estimated Construction Cost:  $10,000
0921-10  Replace lighting controls
The hard wired switches are due for replacement as fixture replacement occurs. The keyed switches in the gym no longer function so the panel board is used to control lighting. Switches are not provided for corridor lights, which are controlled by panel boards.

Deficiency category:  RR, F

Remedy
Replace switches as light fixture replacement occurs in 1956 and 1965 areas of the school. Provide new wiring and conduit. Replace keyed switch system at gym. Add switches for corridor lights.

Estimated Construction Cost:  $22,000
Description of the building system
Classrooms: The classrooms were originally outfitted with three receptacles, one near the sink, one on the teaching wall, and one on the back wall. These spaces have since been retrofitted with plugmold connected to the original circuiting. Some spaces also have been equipped with an extruded aluminum surface mounted wireway. These wireways were probably installed during the information technology upgrade in 1999.

Corridors: Receptacles are pretty scarce along the corridor walls. The maintenance crews seem to manage with longer cords connected to vacuum cleaners.

Computer room: Receptacles are mounted in an extruded aluminum surface divided raceway.

Miscellaneous spaces: In general, there is a lack of receptacles in the school.

Branch circuits: Conductors in the 1956 and 1965 areas were predominately routed in metal conduit in the slab.

Condition of the building system
Classrooms: There is a general lack of receptacles in the classrooms. Modern classrooms are equipped with a surface divided raceway that contains power and communication devices. This type of raceway system has flexibility in device locations and allows the user to easily add new devices to the system. It is likely that the original circuits are heavily loaded since a series of plugmold replaced what was once a couple of receptacles. The receptacles located at the sinks are not ground fault protected. Given there are small children in these spaces, it is particularly important to safeguard these devices. We recommend a surface raceway system be installed in each classroom along with replacement of the receptacles located at sinks with ground fault protected devices.

Remaining life expectancy: 0 years.

Corridors: Typical spacing for ease of cleaning requires devices to be located not more that 40-feet apart. There are some devices throughout the corridor on a 60-foot spacing. We recommend supplementing the corridor receptacles to achieve a more convenient spacing.

Remaining life expectancy: N/A.

Computer room: The extruded aluminum surface divided raceway is suited to this type of environment. There appear to be sufficient devices, with adequate capacity.

Remaining life expectancy: 20 years.
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Miscellaneous spaces: The staff seems to be getting by with plugstrips connected to the few outlets that are located in each space. The concern is that plugging multiple pieces of equipment into a plugstrip will tend to overload the circuits. We recommend supplementing devices as required and reconfiguring the circuiting to accommodate appropriate utilization equipment in each space.

Remaining life expectancy: N/A.

Branch circuits: The metal conduit has deteriorated over the years, and is causing fault conditions in the branch circuit wiring which is now basically unprotected.
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Deficiency

0931-1 Install surface raceways in classrooms
There is a general lack of receptacles in the classrooms. It is likely that the original circuits are heavily loaded since a series of plugmold replaced what was once a couple of receptacles.

Deficiency category: RR

Remedy
Install surface divided raceways with a divider that can house both power and communications devices. Provide new wiring and conduit.

Estimated Construction Cost: $129,000
Deficiency

0931-2  Replace receptacles at sinks with ground fault protected devices
The receptacles located at the sinks are not ground fault protected. Given there are small children in these spaces, it is particularly important to safeguard these devices.

Deficiency category:  C:  NEC Article 210

Remedy
Replace receptacles with ground fault protected receptacles. Provide new wiring and conduit.

Estimated Construction Cost:  $10,000
0931-3 Supplement corridor receptacles
Corridors lack electrical outlets. Existing outlets in 1956 and 1965 portions of building are past their service life.

Deficiency category: RR, F

Remedy
Replace existing corridor receptacles and supplement with new receptacles to achieve 40-foot maximum spacing. Provide new wiring and conduit.

Estimated Construction Cost: $5,500