

The image shows a modern interior space. A large, dark green rectangular box is centered in the upper half of the frame, containing the text 'SPACE TYPES - DESIGN BRIEFS' in white, uppercase, serif font. The background is a photograph of a room with a vibrant orange wall. On the left, there is a square window with a dark frame and a light-colored sill. Below the window, a horizontal strip of recessed lighting illuminates a wall of large, rectangular, light-colored stone tiles. To the right of this tiled area, a dark, possibly black, fireplace or built-in cabinet is visible. The floor is made of light-colored, square tiles. The ceiling is a plain, light color.

SPACE TYPES -
DESIGN BRIEFS

ADULT DETENTION FACILITIES DESIGN BRIEF

The NYC Department of Design and Construction (DDC) manages the construction and renovation of NYC’s correctional facilities. These guidelines specifically apply to the secure areas of Adult Detention facilities like Rikers Island and New York City jails, and will generally apply to juvenile detention centers and courthouse prisoner holding facilities. In addition, some guidelines may apply to other space types where security and vandalism are primary concerns, like psychiatric wards, homeless shelters, drug rehabilitation and halfway houses.

LIGHTING QUALITY STRATEGIES

Correctional facilities have specific considerations because of their function and spatial characteristics. Please review and use the guidelines below, in concert with the basic issues of lighting quality and design strategies set forth earlier in the Design Team Strategies section of this manual.

SPECIFIC LIGHTING QUALITY ISSUES PRIORITIES

ISSUE	IMPORTANCE
System Control	Very Important
Modeling of Faces or Objects	Important
Light Distribution, uniformity, reflectances	Important
Flicker	Important
Daylight Integration and Control	Important
Color Appearance (Dayroom)	Important
Direct Glare (Dayroom)	Important
Relationship of viewer to source and task (Surveillance)	Important

From The IESNA Lighting Handbook 9th Edition.



courtesy: STV Architects

Dayrooms and visitation rooms provide excellent opportunities to introduce daylighting.

System Control

This issue is cited as “very important” by the IESNA because of the needs of the Corrections Officers for immediate and total control of the lighting in emergency situations. While in some facilities some inmates are allowed a measure of personal control of their lights, the Corrections Officers always retain the ability to override personal control. Lighting controls are discussed in greater depth in the specific space-type recommendations below.

Modeling of Faces and Objects

The lighting should enhance the ability of the cameras and staff to identify faces and clearly discern evidence of violence, contraband or weaponry held in prisoners’ hands or under clothes. Light coming from multiple directions, with a slight bias from one direction, will give just enough three-dimensional definition, without creating strong shadows.

Light Distribution, Uniformity and Surface Reflectances

To aid both visual and electronic surveillance, strong shadows should be avoided in all high security areas. Luminance ratios should be close to uniform, preferably no more than a 5 to 1 ratio between maximum and minimum luminances of room surfaces. In order to achieve the desired uniformity, reflectances should be high and finishes diffuse. Ceilings should be a minimum of 80% reflectance. Walls should be a minimum of 70% reflective generally, with 60% acceptable below 30” in common spaces (i.e., not cells). Polished, glossy, and shiny surfaces should be avoided, because specular reflections can reduce visibility.

The most matte finish available that will provide acceptable maintenance should be used. Use eggshell paints, tiles, or anti-graffiti coatings. Use heavily brushed metal surfaces. Avoid glossy floor finishes and polishes.

Flicker

Response to lamp flicker can range from annoyance to extreme agitation, and can reduce self-control. For this reason, flicker should be eliminated in a high-stress environment. Use high-frequency electronic ballasts to prevent fluorescent or metal halide sources from flickering. Defective or failing ballasts that create lamp flicker should be replaced immediately.

Daylight Integration and Control

Daylight and a visual connection to the out-of-doors can have a calming effect on detainees and the staff. It maintains a connection to the outside world and eases the transition from incarceration to freedom. Every effort should be made to introduce properly designed fenestration into secure areas. Control window glare and sun patterns, so that visual and electronic surveillance is not compromised.

Color

Use better color rendering lamps, with a CRI of 84 or higher. Use a correlated color temperature of 3500 to 5000 Kelvin. Good color rendering will aid in visibility and surveillance, and improve the morale of inmates, Corrections Officers and visitors. Since the occupants are not incarcerated in NYC facilities for more than a year and they have access to the out-of-doors, there are no health benefits to lamps emitting UVA or UVB radiation. The use of so-called “full-spectrum lamps” is neither necessary nor recommended.

Direct Glare

Due to the physical constraints involved in manufacturing luminaires that meet vandal-proof criteria (below), high-security luminaires do not have louvers or visors for the control of luminaire glare. Glare control should be accomplished by the proper placement of luminaires. In particular, glare control should be employed to keep lighting off of observation windows and out of the view of cameras and guards in fixed locations. Indirect lighting using coves or pendant luminaires is only feasible in rooms with sufficient ceiling height to make inmate access impossible.

Biological Effects

Lighting levels should be reduced in the evenings and nighttime to enable the inmates to have a normal sleep cycle. Preliminary research has shown that red light (660 nm) has the least affect on human circadian (daily) rhythms. Although the research is not conclusive, the design teams may consider red lights for night lighting in cells and dormitories as long as surveillance is not compromised. On the other hand there should be a way for night-shift Corrections Officers to receive intervals of high levels of light to improve alertness. This photo-biological “boost” should occur in locations remote from sleeping inmates (like a break room) and is best received sometime between 12:00am and 3:30am. Studies suggest that one or more sessions under bright blue light (420-480 nm) with an intensity about four times higher than the ambient level (e.g. 100-150 fc), for a duration of 15 minutes each will promote mental alertness. Additional 5000K+ and 85 CRI lamps can be provided on a separate timer switch for this nighttime function.

LIGHT LEVELS

RECOMMENDED AVERAGE MAINTAINED ILLUMINANCE, IN FOOTCANDLES (FC):

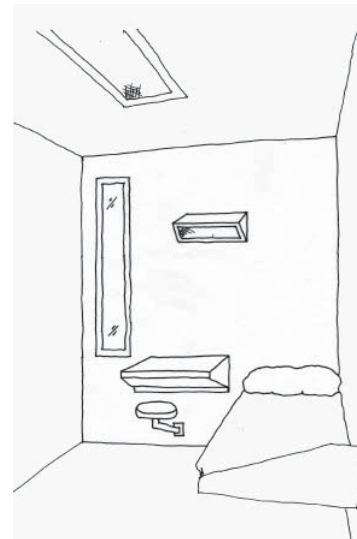
FUNCTION	HORIZONTAL FC	VERTICAL FC	NOTES
Cells & Dormitory	20 general – 30 reading	5	3
Cells/Dormitory Nightlight	0.5 - 2		4
Toilets and washrooms	15 – 20		1
Shower rooms	15 – 20	3	1,2
Dayrooms	15 – 30	5	3
Corridors	15 – 20	3	1,2
Dining	15 – 20		1
Kitchen and Food Prep	50		1

¹ Horizontal value provided by IESNA Lighting Handbook 8th Edition. ² Vertical values provided by IESNA Lighting Handbook 9th Edition. ³ Horizontal and vertical values provided by IESNA Lighting Handbook 9th Edition. ⁴ Requirements not addressed by IESNA, ACA or DOC.

SPACE-TYPE DESIGN GUIDELINES

JAIL CELLS AND DORMITORIES

Provide reasonably uniform ambient lighting of about 20 average maintained footcandles. Locate fixtures so that higher light levels (30 average maintained footcandles) are available for reading, on the desktop in cells and over the pillows on beds in dormitories. Luminance ratios should be about 3:1 maximum to minimum, although the limitation of one luminaire per cell may result in maximum to minimum luminance ratios closer to 5:1. Consider installing a separate “security” type wall-mounted reading light at the head of the bed in a cell. Night lights should be low output (1 to 2 fc) using sources such as T2 fluorescent or compact fluorescent. A separate lamp installed within the high-security luminaires is a good method of uniformly distributing the night-lighting. Consider red lamps or red sleeves on those lamps dedicated for night-lighting.



If only one luminaire is used in a cell, locate it asymmetrically, if necessary, at the end nearest to the desk and head of bed.

TOILETS, WASHROOMS, SHOWERS

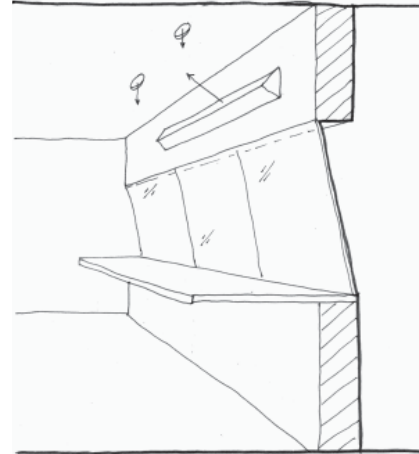
Provide ceiling lighting with a uniform distribution, especially around partial height partitions. Fixtures should be rated for a wet location. Shield lights from dormitory areas to avoid sleep disturbance.

CORRIDORS

Luminaires in corridors adjacent to cells should be located to be out of sight of the Corrections Officers surveying the cells. A uniform distribution of light improves visibility for personnel and electronic surveillance and eliminates shadows or hiding places. Corridors should have light-colored walls and ceilings. Consider two-level switching or high-low ballasts connected to occupancy sensors with a 20-minute time delay. This will save energy, especially at night, while maintaining a uniform distribution of 50% illumination for surveillance from booths or cameras, even when unoccupied.

SECURITY STATIONS/SURVEILLANCE BOOTHS/“BUBBLES”

The ambient lighting should be lower on the inside of surveillance booths than in the area being watched. Local task lights or separately switched downlights can provide sufficient light for reading. Locate ceiling luminaires to reduce reflections on observation glass and computer/video screens. Shield source glare and use combinations of indirect light and task lighting. Avoid spill light from adjacent spaces and corridors and avoid direct glare from exterior windows



Improve visibility from inside Surveillance Booth by:

- Sloped glass to reduce reflections
- Dimmable CFL downlights
- Uplighted ceiling at front of booth

DAYROOM/RECREATION/LOUNGE

Locate lights or TV set to avoid reflections from windows, skylights or luminaires. Try not to exceed a 5:1 maximum to minimum luminance ratio. Provide daylight or view windows in some portion of the space.

DINING ROOM

Provide daylight to the greatest extent possible but control direct sun penetration. Mount luminaires well out of reach of occupants and/or use vandal resistant luminaires. Locate some rows of luminaires close to walls, and space remaining rows for uniform distribution. Try not to exceed a 3:1 maximum to minimum luminance ratio. Walls, ceilings and furnishings should be light in color, 70% reflectance or higher, and no shinier than semi-gloss.

VISITOR/FAMILY ROOM

Provide daylight to the greatest extent possible. Control direct sun penetration with exterior louvers or overhangs. Provide uniform lighting wall to wall that does not exceed a 5:1 maximum to minimum luminance ratio. To achieve such an even distribution, locate perimeter rows of fixtures near walls, and space remaining rows for uniform distribution. Coordinate luminaire layouts with windows and skylights to take advantage of daylighting controls.

ELECTRONIC ARRAIGNMENT ROOMS

Lighting should follow the lighting design principles for typical teleconferencing environment. Luminaires should be located above and to sides of subject, shielded from cameras and monitors. A small amount of lighting behind the subject is preferable. 30 fc of light on the face is generally acceptable, but verify the light-level requirements of the specific camera. The lighting should be relatively uniform, with facial modeling provided from the side and back lights. Fluorescent sources are the best way to achieve the high vertical illumination. Use the same 78- 85 CRI lamps used elsewhere. Avoid harsh shadows or lighting angles that are unattractive and prejudicial. Luminaires within reach of occupants should be “security” type.



courtesy: STV Architects

Control exterior lights so that they can be reduced during hours of no activity, but immediately restored in case of emergency.

EXTERIOR ACTIVITY YARD AND PERIMETER SURVEILLANCE

Control angle of light for best viewing from surveillance locations, including guards and cameras. Reduce light pollution to the sky and light trespass into the community. Consider energy conservation issues, and use multiple level controls for different levels of security. Consider the use of two-level high-low ballasts for metal halide lamps in order to get a quick response to full on in case of emergency.

ENERGY EFFICIENCY STRATEGIES

Specific Strategies for Energy Conservation in Correctional Facilities

- Light colored finishes contribute through interreflections
- Very efficient sources since they will operate for long hours
- Lighting controls that provide multiple levels
- Daylight harvesting
- Improve uniformity rather than over-lighting spaces
- Distribution of light to wall to give sense of brightness

ENERGY CODES: WATTS / SQUARE FOOT BUDGETS

FUNCTION	NYS ENERGY CODE		ANSI/ASHRAE/IESNA STD.90.1		NOTES
	2002	+/- 2006	1999 / 2001	2004	
“PENITENTIARY” BUILDING (Building Type Method Only)		1.0	1.2	1.0	1,3
Cells/Dormitory			1.1	0.9	2,3,4
Toilets and Washrooms	0.8	0.9	1.0	0.9	2,4,5
Shower rooms	0.8	0.9	0.8	0.6	2,4,5
Dayrooms			1.4	1.2	2,3
Corridors	0.8	0.9	0.7	0.5	2,4,5
Classrooms	1.6	1.4	1.4	1.3	2,4
Audience/Seating Area	1.6	1.8	1.9	0.7	2,4
Dining	1.4	0.9	1.4	1.3	2,4
Other	1.0	1.0			

1. Multiply this value by the total square footage of the building, to determine the total building interior power allowance, using the Building Type method. 2. Multiply this value by the square footage of the dedicated space function. Sum the results of all the individual spaces in the building to determine the total building interior power allowance using the space-by-space method. The design of an individual space is not required to meet the watt/sf limits, as long as the total building connected load does not exceed the total interior power allowance. 3. Function category not listed in NYS Energy Code. 4. Values are for the space type but are not specific to penitentiary-type facilities. Values in bold are specifically for “penitentiary.” 5. NYS Energy Code values are from “Corridor, restroom, support area” category.

LIGHTING CONTROLS

To maintain security, no area of a correctional facility should be entirely darkened, and when light levels are reduced, uniform distribution should be maintained. “Panic switches” for emergencies should turn the lights on to full. Work closely with the specific facility to achieve the correct balance of inmate control, automatic control, staff control and overrides.

Generally, all cells, dormitories and dayrooms are connected to master on-off switches controlled by the Corrections Officers from within the surveillance booth. Automatic timers may be appropriate for turning some of the lights on or off on a regular schedule to maintain a routine by signaling that the sleeping period is ending or about to begin, but this should be discussed with the management. Multiple-level switching is often appropriate, based on daylight availability and occupancy. In addition, some level of night lighting must be provided in a relatively uniform pattern. There are different control strategies for different areas.



courtesy: STV Architects

Multiple-level switching works well for dayrooms. The highest light levels should be reduced at night or when the space is unoccupied.

CELLS

There are reasons to provide multiple-level lighting control to individual cells. Lawsuits have been brought on behalf of inmates requiring at least 30 footcandles of reading light on the desk top, or at the head of the bed. On the other hand, luminaires have been vandalized by inmates attempting to reduce the light levels in their cells. Since multiple luminaires or multiple lamps are required to light a jail cell, it is feasible to have two-level switching capability. At the most basic level, a switch outside the cell (out of reach) can be used by the staff to set a desired full-time light level for each cell occupant. Another strategy is to provide a tamperproof “bolt” switch inside the cell controllable by the occupant, to reduce the lighting in the cell by 1/2 or 2/3. (See Luminaire Schedule). This degree of occupant control may improve morale and reduce vandalism of cell lighting fixtures. Finally, night lights incorporated into the luminaires can be connected to momentary contact bolt switches on the outside of the cell, so that a Correctional Officer can look through the surveillance window, briefly turn on the night light, and move on to the next cell, with minimal or no disturbance to sleeping inmates.

DORMITORIES

Where daylighting provides at least 30 fc for 50% of annual daytime hours, consider photocell-operated switching or dimming controls for dormitories. Night lighting should be no more than 1 fc and uniformly distributed. Glare from adjacent areas must be controlled so that the eyes of the ambulatory guard can adapt to the nightlight level, using a flashlight as supplementary lighting. If desired, an increase to 2-4 fc can be available via separate switches, zoned for short-term surveillance.

DAYROOMS

Consider at least two levels of uniformly distributed ambient lighting, (one level can be switched or dimmed by daylight sensors during the day and by inmates at night) and a separate night-lighting level for ambulatory Corrections Officers or for surveillance from booths. Consider supplying supplemental reading lights (using “security” type luminaires) at a few locations for older or visually-impaired inmates.

TOILETS, SHOWERS

Consider two-level switching or high-low ballasts connected to occupancy sensors with 20-minute time delay, so lighting levels do not exceed 50% (33% preferred) when spaces are unoccupied. Shield the lights from the dormitories, to minimize sleep disturbances caused by changes in luminaire output at night.

CORRIDORS

Consider two-level (33%-100%) switching activated by occupancy sensors with a 30-minute time delay.

SURVEILLANCE BOOTHS

Consider multiple-level switching and separate task lighting controls, accessible to the guards. It should never be possible to turn off all the lights, but very low light levels (2-10fc) should be possible for booths within dormitories at night. The lower the light levels are within the booths, the easier it is for the Correctional Officers to see into the darkened dormitories.

DINING ROOM

Consider a photocell-controlled switching strategy to turn off lights when daylight is 30 fc or higher. Provide multiple levels of controls accessible only to staff by key or restricted location.

VISITOR-FAMILY ROOMS

If daylight exceeds 50 fc for more than 30% of daytime hours, consider a photocell-controlled multiple level switching or dimming system. Specify luminaires with two level ballasts or in-line two-level switching. Circuit luminaires in zones that correspond to space functions and daylighting distribution.

EXTERIOR ACTIVITY YARD AND PERIMETER SURVEILLANCE

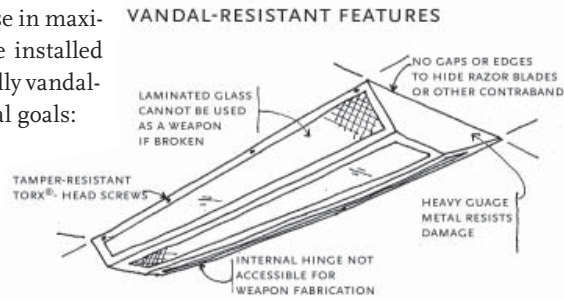
Consider the use of two-level high-low ballasts for metal halide lamps in order to get a quick response to full-on in case of emergency.

SPECIAL CONSIDERATIONS FOR ADULT DETENTION FACILITIES

“SECURITY” TYPE LUMINAIRES

Special luminaires are available specifically for use in maximum-security areas. It is assumed that they are installed into or attached to ceilings and walls that are equally vandal-resistant. “Security” type luminaires share several goals:

- Sturdy construction to prevent disabling of the light or destruction of the luminaire. (See Sample Luminaire Schedule at the end of this Brief for material requirements).
- Tamperproof construction and tight mounting to surfaces, to avoid prisoner access to electricity, hiding places for contraband or the use of parts for weapons.
- Smooth edges so they cannot be used as tools.



LIGHT LOSS FACTOR

Although maximum-security luminaires are enclosed and tightly constructed, they are not airtight, and are prone to dirt buildup. In addition, inmates have been known to obscure the lenses in their cells (with ink-impregnated toothpaste, or paper and tape) in order to physically reduce the light transmission. While the room surfaces in correctional facilities are usually kept quite clean due to inmate labor, the electrical devices must be cleaned by electricians or staff maintenance. At the very least, it should be assumed that luminaires are cleaned when lamp burnouts are replaced. In spite of the above it is recommended that a light loss factor of 0.70 or higher be used in calculating “maintained” illuminance for correctional facilities, to save energy and avoid excessive overdesign of the lighting system. The “High Performance” T8 lamps recommended for all DDC facilities extend lamp life, and also retain over 90% of their initial output for a much longer time.

EMERGENCY AND SECURITY LIGHTING

Jail facilities in New York City are required to have redundant emergency systems and backup generators. In addition, DDC requires battery backup in emergency lights. Verify that any lighting controls will default lamps to on in case of control equipment failure.

EXTENDED LIFE AND FREQUENTLY SWITCHED LAMPS

Due to the tamper-proof construction and security restriction for maintenance, every effort should be made to extend lamp life in correctional facilities. “High Performance” T8 lamps are available in “extended life” versions that increase the rated lamp life to 24,000 hours or more. Fluorescent lamps that are subject to more than five on-off cycles per day should be operated on multi-level ballasts, which keep the lamp cathodes warm at the lowest setting, or on programmed-start ballasts, which soften the impact of the starting voltage. Both technologies protect the lamps from premature burn-outs under conditions of frequent switching.

SPECIAL COMMISSIONING CONSIDERATIONS

For obvious reasons of security, commissioning of lighting systems must be done prior to occupancy of correctional facilities.

VERIFICATION

Emergency equipment, such as standby lighting, batteries, power generators, and alarms should be checked frequently to ensure their reliability.

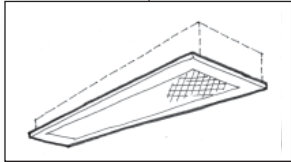
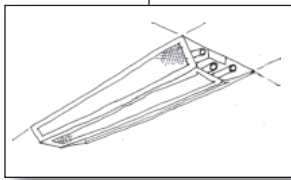
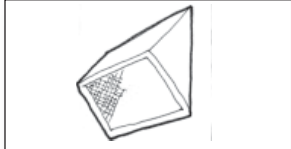
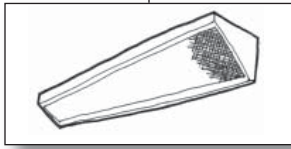
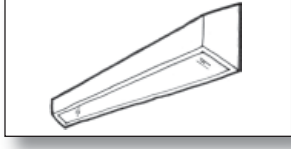
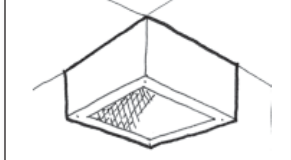
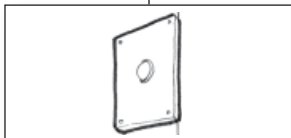
GROUP RELAMPING

Group re-lamping makes a lighting system more efficient by keeping light output closer to design levels. It also saves significantly on labor costs. However, the difficulties of vacating secure areas for lengthy time periods or acquiring security clearances for maintenance crews will likely override the concerns for cost savings.

SAMPLE LUMINAIRE SCHEDULE FOR ADULT DETENTION FACILITIES

“SECURITY”-TYPE LUMINAIRES: MATERIAL REQUIREMENTS

- Cold Rolled Steel. White painted: high reflectance polyester powder coat baked finish.
 - Minimum Security – 18 ga steel
 - Medium Security – 16 ga steel
 - Maximum Security – 14 ga steel
 - Ultramax Security – 12 ga steel
- Glass: 1/2” thick laminated glass assembly, two layers of tempered glass each 1/4” thick. Prismatic glass on cell side and clear glass on lamp side. No acrylic or polycarbonate layers.
- Fasteners: TORX® -head tamper-resistant screws

	<p>FLUORESCENT 1'x4' LENSED FIXTURE, RECESSED OR SURFACE-MOUNTED</p> <p>Location: Cells, dormitories, corridors, dayrooms, toilets, shower rooms Lamps: (2 or 3) 28-32W, High Performance T8, 835 – 850 color Description: Recessed or surface-mounted luminaire, integral compact fluorescent night light (7-9w) in sleeping areas. Damp or wet label where appropriate.</p>
	<p>SURFACE MOUNTED WIDE-DISTRIBUTION LUMINAIRE</p> <p>Location: Cells, dormitories, dayrooms, corridors, toilets, shower rooms Lamps: (3) 28-32W, High Performance T8, 835 – 850 color Description: Fluorescent luminaire with completely concealed piano hinge. One lamp for each diffusing panel. Integral nightlight for sleeping areas. Wide distribution. Damp or wet label where appropriate.</p>
	<p>CORNER FLUORESCENT READING LIGHTS</p> <p>Location: Cells Lamps: (1) or (2) 17-32W, High Performance T8, 835 – 850 color Description: 2', 3' or 4' long luminaire, mounted above desk and/or bed. Completely concealed piano hinge.</p>
	<p>CORNER FLUORESCENT</p> <p>Location: Stairwells, corridors, toilets, shower rooms Lamps: (2) 28-32W, High Performance T8, 835 – 850 color Description: Completely concealed piano hinge. Damp or wet label where appropriate.</p>
	<p>WALL-MOUNTED FLUORESCENT DIRECT/INDIRECT</p> <p>Location: Guard surveillance booths Lamps: (2) 28-32W, High Performance T8, 835 – 850 color Description: Uplight 30% - Downlight 70% .</p>
	<p>METAL HALIDE DOWNLIGHT, RECESSED OR SURFACE-MOUNT</p> <p>Location: Dayrooms (two or three stories) Lamps: (1) 70W-150W ceramic metal halide, 3200 – 5000 Kelvin Description: Lens secured by through-studs. Completely concealed piano hinge. Emergency restrike capability.</p>
	<p>TOUCH™ BOLT™ SWITCH</p> <p>Description: Stainless steel. Touch bolt. Security-type on-off switch.</p>

