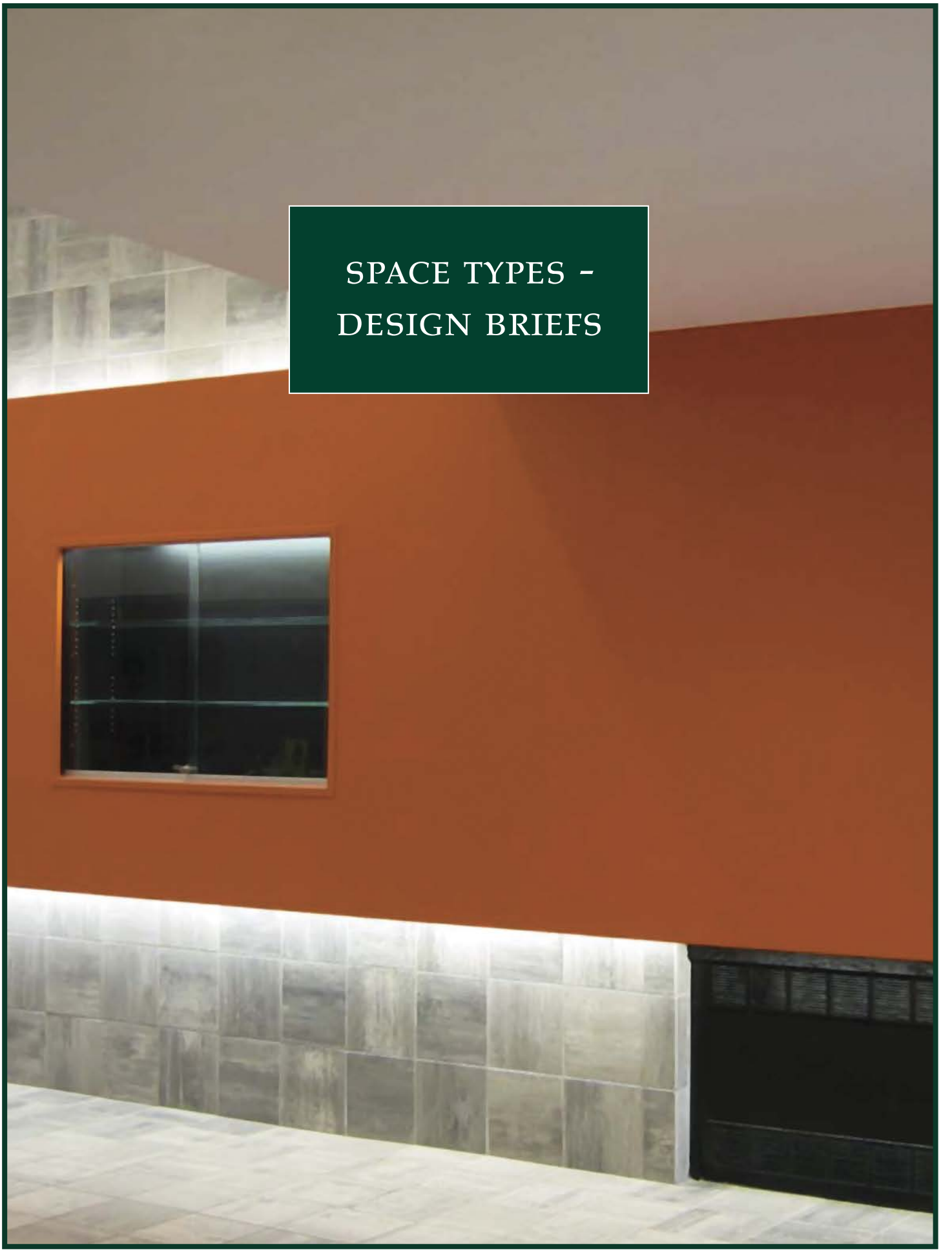


SPACE TYPES - DESIGN BRIEFS

CORRIDORS & STAIRS DESIGN BRIEF

The NYC Department of Design and Construction (DDC) manages the construction and renovation of NYC's municipal buildings, all of which have circulation corridors, and most of which have stairs. This is intended for interior spaces, but has some application to exterior nighttime lighting.

LIGHTING QUALITY STRATEGIES

Corridors and stairs have specific considerations because of their function and spatial characteristics. Many of them are the designated means of egress in case of emergency. Please review and use the guidelines below, in concert with the basic issues described earlier in the Design Strategies section of this manual.

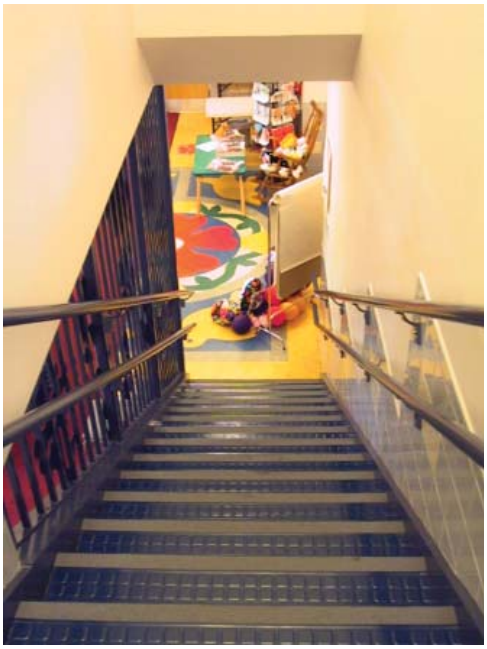
SPECIFIC LIGHTING QUALITY AND QUANTITY STRATEGIES

ISSUE	IMPORTANCE
Safety	Very Important
Shadows on stair risers and corridor surfaces	Very Important
Modeling of Faces or Objects	Important
Luminances of Room Surfaces	Important
Light Distribution on Surfaces	Important
Direct Glare	Important
Daylighting Integration and Control	Important

From The IESNA Lighting Handbook, 9th Edition

Safety

Any change in elevation increases the risk to pedestrians of stumbling or falling. This can happen in broad daylight, so lighting is not the only factor. The most important safeguard is to make sure the pedestrian is aware that the stairs are there at all. A single step is more dangerous than a flight of steps, because it is often overlooked. Stair awareness requires coordination between the architect and the lighting designer. At the very least, the top and bottom steps should be distinguished from the landing or adjacent paving, and this is best accomplished by changes in materials. Providing a bright contrasting color and textural change on the nosing of each tread is recommended for the elderly and visually impaired. The riser should be a slightly darker reflectance than the tread, to increase the differentiation between tread and riser. Lighting located at the top and bottom of a string of steps both announces the presence of a change in elevation, and enhances any contrast in material finishes. Once a pedestrian has found the first step, lighting visibility is only moderately important until the last step, as long as the tread and riser dimensions remain constant. The top and bottom of ramps should be treated like stairs.



courtesy: NYC Department of Design & Construction

Lighter-colored band on nosing makes steps more visible.

In corridors, wall-mounted lighting fixtures can be hazardous to building occupants. The Americans with Disabilities Act (ADA) requires that any part of a luminaire below the height of 6'-8" shall not protrude into an egress corridor more than 4". This is intended to protect the blind from physical injury, but

protects everyone walking close to the walls, and is good practice even when a corridor is not the official path of egress. A large number of ADA compliant wall sconces are available nowadays. In general, distributing light to the walls rather than the floor aids pedestrian orientation better than directing the light down to the floor. Sharp shadows, shiny materials and randomly patterned carpets or finishes should be avoided, since they are disorienting, especially to the elderly or visually impaired. The architect can improve visibility by providing contrasting materials or colors at the junction of the floor and walls. While some non-uniformity in corridors is desirable to avoid monotony, the patterns of light and dark should be relatively gentle and never create confusion or disorientation.

Shadows

In general, harsh shadows should be avoided in both corridors and stairs. They are not only disorienting, but they may obscure debris, obstructions or even people. Diffuse sources such as fluorescent luminaires, and light colored wall and ceiling finishes will create enough inter-reflections to prevent this. In should be noted, however, that properly placed shadows can help with the safe navigation of stairs. Lighting distributed from the top of the stairs, downward at the proper angle, can put the riser in shadow, and create a small shadow line at the back of the lower tread. This helps distinguish the bright nosing of each tread from the step below. This is easier to accomplish in exterior lighting applications.

Three-Dimensional Modeling

Identifying other people as well as objects in corridors and stairwells is an important goal for both safety and civility. Lighting strategies that distribute light to all the space's surfaces will generally provide adequate facial modeling.

Light Distribution on Surfaces

Corridors: Lighting designs should distribute light to the walls and ceilings rather than only to the floor. Such spaces will be perceived as brighter, consume less energy, and will be safer and more conducive to way-finding.

Stairs: Light should be distributed to the walls and steps, and indirect light on the underside of landings is also appropriate. Diffuse lighting located at the landings is usually the starting point, and may be the only lighting required.

Glare Control

Glare not only causes discomfort but can diminish the ability to maneuver the stairs safely. Shiny surfaces should be avoided to prevent reflected glare.

Uniformity

Light levels should be relatively uniform in stairways so that pedestrians can see the stair edges and see details in the shadows. By locating luminaires at the top and bottom of a set of steps, the higher light levels emphasize the changes in elevation. The same strategy can be used in corridors by locating luminaires at corners and intersecting corridors. However, luminance contrast should not be much greater than 5 to 1, to prevent changes in the eye adaptation level.

Daylighting

Daylight is desirable in corridors and stairwells. It provides a welcome relief, views, and a connection to the outdoors. Some direct sun penetration may even be acceptable, as long as it does not have an impact on cooling loads, and does not cause disabling glare near changes in elevation.

Color

In order to limit the number of lamp types on a project, the lamps used in corridors and stairs should be the same as used elsewhere.

LIGHT LEVELS RECOMMENDED AVERAGE MAINTAINED ILLUMINANCE, IN FOOTCANDLES (FC):

FUNCTION	HORIZONTAL FC (AT FLOOR LEVEL)	NOTES
Corridors (active)	5	
Stairs (active)	5-10	1

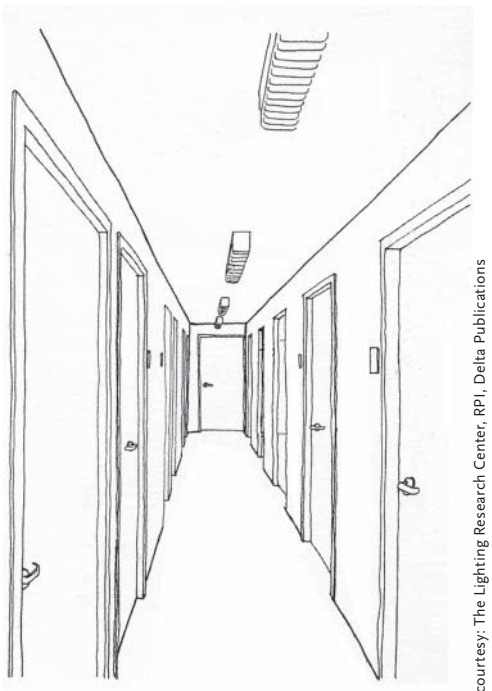
From The IESNA Lighting Handbook, 9th Edition.

1. NYC Life Safety Codes may differ.

DESIGN AND LAYOUT STRATEGIES

CORRIDORS

There are a wide variety of acceptable lighting solutions for corridors. Upcoming energy code allowances will approximate an average of 36 watts every 15' for a five foot wide corridor, but this can be achieved in many different ways. In general, the types of luminaires used in office spaces will concentrate too many lumens and consume too many watts to be used effectively in corridors. The objective is to distribute light on the walls, so luminaires that distribute the light diffusely, like luminous "buttons" mounted to the ceiling, or luminous wall sconces, are reasonable options. (See luminaire schedule). Linear fluorescent lamps (2', 3', 4') will produce more lumens per watt than compact fluorescent lamps, but both may be used. Recessed wall washers, lighting artwork or graphics, are another solution. Light colored wall finishes (65%+) are recommended, since they will reflect more light, resulting in a brighter appearance for the same light output.



courtesy: The Lighting Research Center, RPI, Delta Publications

Luminaires should distribute light to the corridor walls.

STAIRS

Fire stairs may be unfamiliar to the user, especially if only used in emergencies, so should be lighted in a simple, straightforward way. It is unadvisable to mount luminaires directly over the steps, because the luminaires will be difficult to maintain. The most common solution in stairwells is a wall-mounted fluorescent fixture mounted at each landing. The distribution should be wide enough that the illumination overlaps on the intermediate steps. The lighter colored the finishes are in a stairwell, the more the interreflections will spread the light. A luminaire that shields the direct view of the lamp is preferred, but in a white painted stairwell, even a bare lamp T8 may be acceptable, as long as vandalism is not a problem.

In more decorative stair or ramp applications, like public lobbies or theaters continuous luminaires (such as LED strips) running parallel to the steps, located under the nosing, can be very effective, but costly. Individual step lights are designed to be mounted on the adjacent wall, about 18" above the treads. At the very least, one should be located at the top and bottom tread. More, low output steplights on a regular pattern related to the treads are safer than just a few, very bright steplights. Lights mounted under handrails are another option, but caution should be used because these may be glary if the run of stairs extends above eye level, and they may provide more lumens or consume more watts than can be accommodated under the energy codes.

ENERGY CONSERVING DESIGN STRATEGIES

CORRIDORS AND STAIRS — SPECIFIC STRATEGIES FOR ENERGY CONSERVATION

- Use light-colored finishes to achieve more brightness and inter-reflections for the wattage consumed.
- Linear fluorescent lamps are a good choice for stairs. They are diffuse, easily controlled, and restrike instantly for emergency usage
- Use daylight when available so that electric lighting is not required during most hours of occupancy.
- Consider multiple level output ballasts connected to occupancy sensors in some luminaires in circulation areas where full darkness is not acceptable to owner or users.

courtesy: NYC Department of Design and Construction

Light-colored finishes improve the light distribution through inter-reflections.

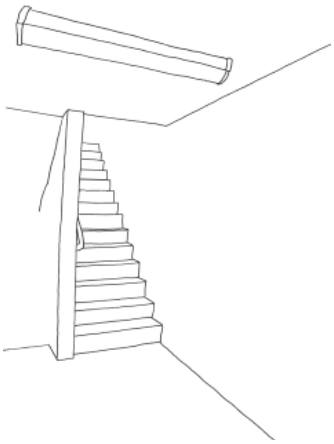
ENERGY CODES: WATTS / SQUARE FOOT BUDGETS

	ENERGY CONSERVATION CODE OF NEW YORK STATE		ANSI/ASHRAE/IESNA STD.90.1		
FUNCTION	**2002**	**+/- 2006**	**1999 / 2001**	**2004**	**NOTES**
Corridors	0.8	0.9	0.7	0.5	1
Corridors-Healthcare	0.8	0.9	1.6	1.0	1,2
Stairs	0.8	0.9	0.9	0.6	1,3

1. Multiply this value by the square footage of the dedicated workshop spaces. 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. 2. NYS Energy Code does not differentiate between types of corridors. 3. NYS Energy Code does not list a separate category for stairs. Value comes from category of "Corridor, restroom and support area"

LIGHTING CONTROLS

If circulation spaces are daylighted, a simple photosensor on-off or two-level switching strategy can be employed. (See the control technologies section.) In corridors or stairs that are actively used, i.e. are occupied at least once every twenty minutes throughout the workday, lighting controls should be designed to automatically shut off most or all lights after the spaces are no longer occupied. See nightlighting, below. For circulation spaces that are only intermittently used (service corridors) or rarely used (firestairs) there are methods of occupancy sensing controls that can save considerable energy over the life of the building. Ultra-sonic motion sensors designed for long corridor applications are readily available. In stairwells, these should be most sensitive to detecting the motion of the door opening. Since a broken occupancy sensor defaults to full on, this technology does not represent an emergency risk. Verify than any controls specified in stairwells have a fail-safe operation that meets all safety requirements for egress.



courtesy: The Lighting Research Center, RPI, Delta Publications

Locate luminaires above stair landings so they are accessible for maintenance.

Automatic on-off occupancy sensing is a simple choice and acceptable for many buildings where the occupants feel secure. The time delay should be set for about 30 minutes and the sensitivity set to "high". In buildings involving multiple tenants or open to the general public, the occupants may not feel secure having the lights suddenly turn on a completely dark space. In such cases, a small percentage of lights (5%-10%) can remain on during extended hours of occupancy. These should be located adjacent to doors or other points of entry. If there are multiple points of entry, so that the number of lighted fixtures would be in the 20%-25% range, the fixtures closest to these doors can be fitted with two- or three-level ballasts, so that they operate at a lower level (33%-50%) when the space is unoccupied, then increase to full output when the space is occupied. All the remaining lights in the corridor can be turned from full off to full on from the same occupancy sensor.

It appears that New York City will allow stairwells to be controlled in the same way, with low output (33%) when unoccupied, then increase to full when the stairwell doors open or other motion is detected. Because the lowest light level keeps the cathodes warm, the lamp life is not reduced with frequent multiple-level switching. Some manufacturers provide luminaires with integral motion sensors and high-low ballasts, designed expressly for stair and corridor applications.

Night lighting: Only the minimum lights should operate all night after the building is empty. Provide night lighting at entries so that employees or emergency personnel can find local switches. Provide the minimal night lighting necessary for safety and security and use occupancy sensors for night lighting controls. Consider motion-activated recording devices and lights where un-monitored security cameras are used.

OTHER CONSIDERATIONS

DAMP LABEL

Use Damp labeled (DL) luminaires for corridors or stairs that are on the exterior of a building but protected by an overhang. Even if an interior stairwell leads to the exterior of a building, specifying DL fixtures is good practice.

COMMISSIONING

Commissioning and calibration of lighting controls and emergency systems is necessary to ensure that equipment operates as intended. Equipment related to lighting any paths of egress should be re-commissioned annually.

DIRT DEPRECIATION

Corridors and stairs may be classified as “very clean” to “dirty” depending on their location. Cleaning of light fixtures is recommended every two years in a clean environment, and annually a dirty one.

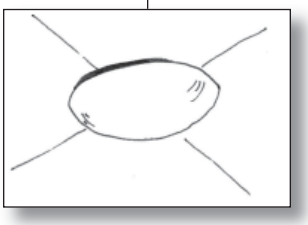
EMERGENCY LIGHTING

In the event of an emergency, corridors and stairs are the primary means of egress in a building. Some or all of the lighting in egress corridors and stairs should be on an emergency circuit. If an emergency generator is not used, all lights on the emergency circuit must be fitted with battery packs or inverter ballasts. If emergency batteries are used, they need to be tested every two years.

ELECTRICAL CODE ISSUES

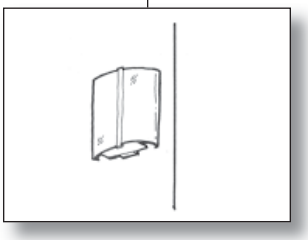
The team must conform with New York City codes, ADA, and any other relevant requirements for life safety issues for corridors and stairs.

SAMPLE LUMINAIRE SCHEDULE FOR CORRIDORS AND STAIRS



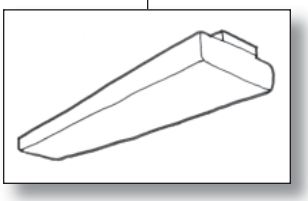
SURFACE-MOUNTED OR SEMI-RECESSED BUTTON LIGHTS

Location: Corridor ceiling
Lamps: (1) 26W or (2) 13W Twin Tube CFL, 830 – 835 color
Description: Surface-mounted bowl with white opal glass or acrylic diffuser. Electronic ballast.



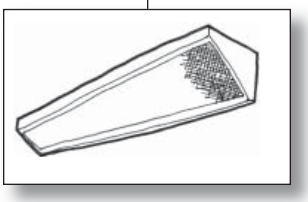
ADA WALL SCONCE

Location: Corridor wall
Lamps: (1) 26W quad, or (2) 18W Twin Tube CFL, 830 – 835 color
Description: Decorative wall sconce with glowing front face. Extension from wall must be less than 4" or the bottom must be mounted at least 6'-8" above the floor for ADA compliance. Electronic ballast.



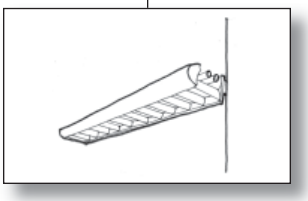
FLUORESCENT WRAP-AROUND

Location: Stairwells: ceilings, walls or undersides of landings
Lamps: (1) or (2) 28-32W, High Performance T8, 835 - 841 color
Description: Surface-mounted. White baked enamel housing and prismatic lens. Multi-lamp ballasts. 66% minimum fixture efficiency. When used on wall, extension from wall must be less than 4" or the bottom must be mounted at least 6'-8" above the floor for ADA compliance.



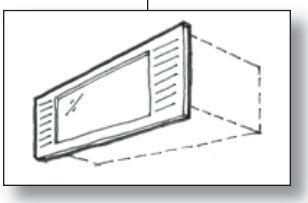
FLUORESCENT TRIANGULAR WALL FIXTURE

Location: Stair walls
Lamps: (1) or (2) 28-32W, High Performance T8, 835 – 841color
Description: Surface-mounted. White baked enamel housing and prismatic lens on two sides. Electronic instant-start, multi-lamp ballasts.



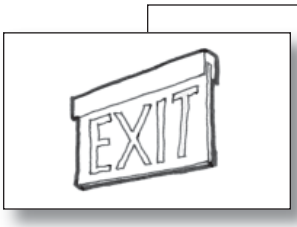
FLUORESCENT WALL-MOUNTED FIXTURE DIRECT/INDIRECT

Location: Corridor
Lamps: (1) or (2) 28-32W, High Performance T8, 835 – 841 color
Description: Surface-mounted fluorescent luminaire in lengths of 4' or 8'. White baked enamel housing and white or semi-specular louver. Electronic parallel instant-start, multi-lamp ballasts.



RECESSED STEP LIGHTS

Location: Stairs, ramps, corridors
Lamps: (1) 18W, 1200 lumens 835 – 841 color
Description: Compact fluorescent step light. Wall-recessed, prismatic lens or louver. 120v integral ballast. Mount a minimum of 12" above the step, 18" preferred.



LED EXIT SIGNS

Location: Corridors, Stairs, Rooms
Lamps: Red LEDs
Description: Surface-mounted, edge-lit or back-lit LED exit sign. Letters must be red and a minimum of 8" high in NYC.