

Training room

The training room space is located on the first floor of the Hall Corporate Headquarters room number 131. This space is a large work space that will be used like an open office setting with meetings and training for new employees. This space is ideal for a recessed lighting or a pendant lighting system comparison. The area of the space is 1650 sq. ft. and has a ceiling height of 8'-6" feet. The activities that will take place in this space are salesperson training, office paper work, computer use, and general meetings. The space will need illuminance levels of around 30+ Fc for the tasks that will take place. The room has a large amount of windows which will need to be shaded to be able to control the amount of light entering the space during the working hours. The finishes (carpet, walls and ceiling) inside the training room are the same as the boardroom.

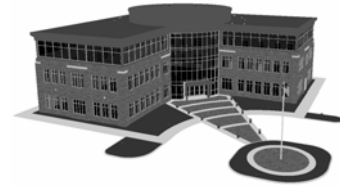
The design criteria for this space involved the following:

- Lighting Design Criteria
 - **Integration of daylight**
 - Large amount of windows located on north and east walls
 - Use of motorized shading to control amount of daylight entering space
 - **Meeting place for employees**
 - Multi levels of light controlled by dimming switches
 - Close interaction between occupants
 - **Horizontal illuminance**
 - Approximately 30+ Fc on the work tables
 - **Direct glare from fixtures**
 - Keep in compliance with luminance ratios
 - Luminance ratios within immediate view should not exceed 3:1 from persons face to the background. Ratio is very important because of the facial rendering of the occupants
 - **Ceiling uniformity**
 - Ratio of 8:1 for uniformity of light on the ceiling not to exceed 825 Cd/m² if less than 425 Cd/m² the uniformity is not such an issue

In the training room a system comparison between pendant and recessed lighting was conducted. The following is how each of the light fixtures were used in the space.

The lighting concept for the space involved the following:

- **Downlights**
 - Compact fluorescent lamps located in front of room to light entrance area to room
 - Wallwash lenses used in downlights in front of room to put light on presentation white board
- **Recessed parabolic troffer**
 - Used to produce light on the work plane throughout the room.
- **Pendants with direct and indirect light component**



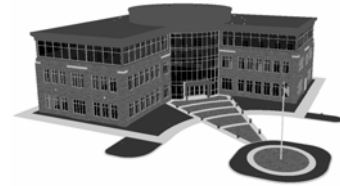
- Provide light on worktables and ceiling for good uniform distribution of light throughout space
- Indirect light is good for facial rendering
- Although the low ceiling the pendant system will allow the space to appear more open

The equipment selected to be used in the training room is as follows.

Fixture and lamps

	<p>Recessed Parabolic troffer</p> <p>Manufacturer: Lithonia</p> <p>Catalog # 2PM3MN 2' x 4' paramax</p> <p>Dimensions: 2' x 4' x 3" deep</p> <p>3 – F32T8 Lamps</p>
	<p>Arcos perf II Pendant</p> <p>Manufacturer: Litecontrol</p> <p>Catalog # P – SI - 5900</p> <p>Dimensions: 2 – 3/8" x 9 – 9/16" x 96"</p> <p>2 – F32T8 lamps</p>
	<p>LF6 Downlight</p> <p>Manufacturer: Litecontrol</p> <p>Catalog # LF6</p> <p>Dimensions 6" Diameter</p> <p>6" x 9-7/8"</p> <p>1- CFTRT32W Lamps</p>

Note: All interior lamps will have a CCT of 3500 K and a consistent CRI of greater than 80 for uniform color rendering throughout the building.



Recessed System Luminaire Schedule

Label	Description	Ballast	Input Watts	# Used	Watts
E	2x4 recessed	VEL-2P32-SC	58	14	812
		VEL-1P32-SC	32	14	448
C	Downlight	VEZ-IT42-M2-BS	35	6	210
D	Wall washer Downlight	VEZ-IT42-M2-BS	35	2	70
				Total Watts	= 1540
Area = 1600 Sq.Ft.				Power Density	= 0.96 W/Sq.Ft.

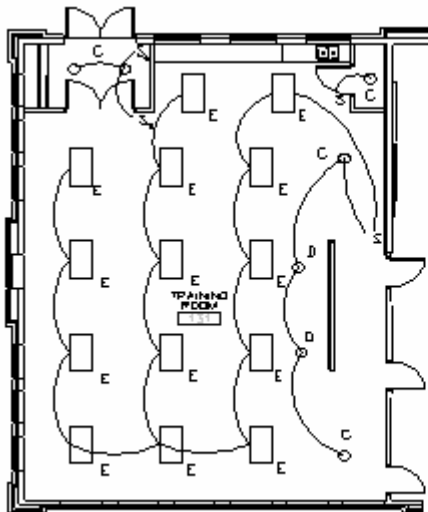
Pendant System Luminaire Schedule

Label	Description	Ballast	Input Watts	# Used	Watts
F	Pendant system	VEZ - 2S32	70	18	1260
C	Downlight	VEZ-IT42-M2-BS	35	8	280
D	Wall washer Downlight	VEZ-IT42-M2-BS	35	2	70
				Total Watts	= 1610
Area = 1600 Sq.Ft.				Power Density	= 1.0 W/Sq.Ft.

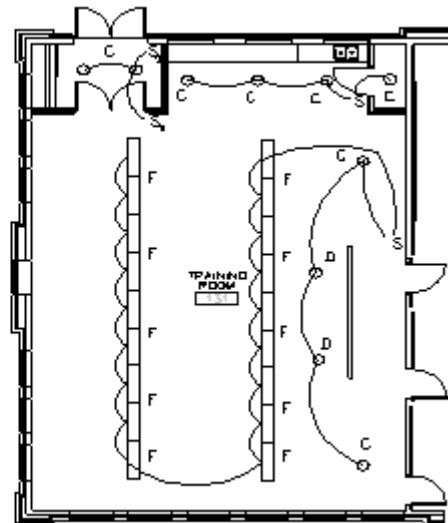
The power density allowed in a conference room space by ASHREA 90.1 is 1.3 W/Sq.Ft. The power density calculated with the redesigned lighting system is 0.96 W/Sq.Ft for the recessed system and 1.0 W/Sq.Ft for the pendant system.

Lighting Layout, Circuiting and Switching

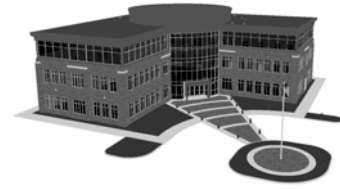
Recessed System



Pendant System



The lighting layout in the recessed system is a typical layout for 2' x 4' troffers that fits into the 2' x 2' ceiling grid. The lights give a good distribution in the room with some hot

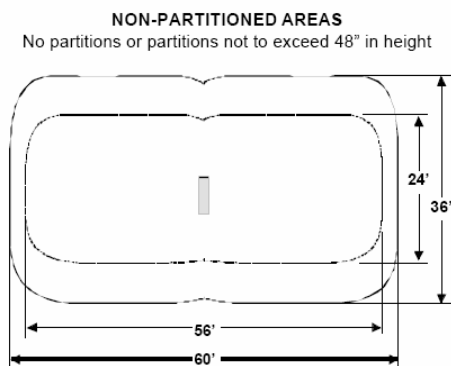


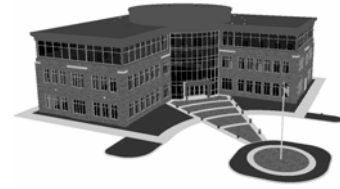
spots due to the overlapping of light from some of the fixtures. The downlights located throughout the space give the additional light need for the entrance ways, exit ways, closets and sink area. The system produces over 40 Fc on the work plane which is higher than the recommended amount of 30 Fc by the IESNA on a task plane where reading and writing will take place. The power density for this system is very low as compared to the allowable amount by ASHREA 90.1 and the existing design for the space. The power density calculated for this space is 0.96 W/Sq.Ft. This system works well but isn't very aesthetically pleasing and could cause glare problems with the occupants during their training.

The Pendant system is laid out to give a uniform distribution of light on the work plane in the space. The light on the work plane is very evenly distributed and allows for a comfortable work area for the occupants. The downlights located throughout the space give the additional light need for the entrance ways, exit ways, closets and sink area. The power density for this system is very low as compared to the allowable amount by ASHREA 90.1 and the existing design for the space. The power density for this space is 1.0 W/Sq.Ft. The two systems have almost identical power densities but the performance of light distribution is better in the pendant system. The recessed system uses 42 T8 lamps where as the pendant system uses only 36 T8 lamps which will be a small cost savings in the long run. The pendant system I feel is the better lighting solution for this space and should be used.

Occupancy Sensors and Window Shading

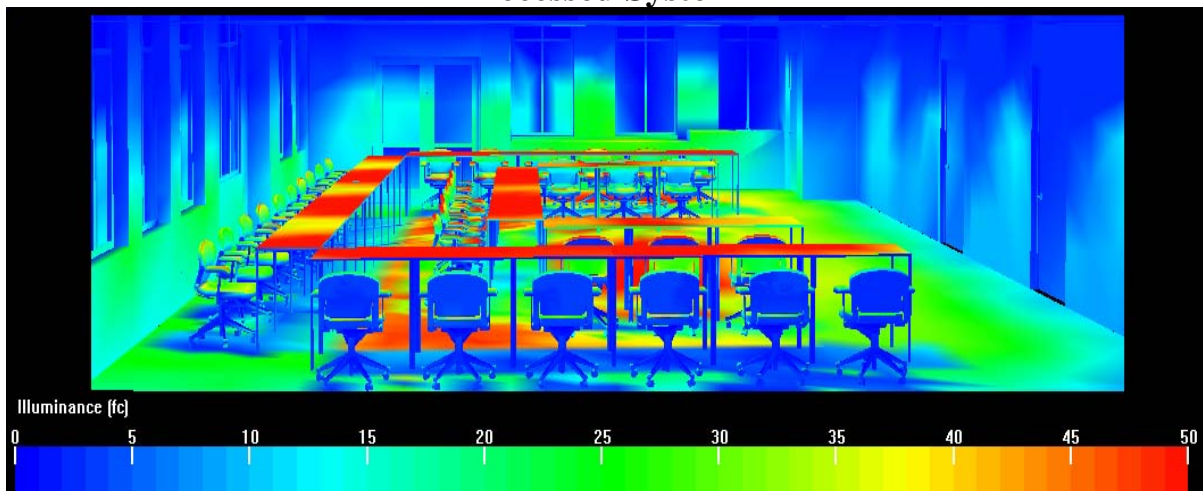
In order to comply with ASHREA 90.1 Shut off requirements for lighting, occupancy sensors will be installed in all spaces in the building. Novitas systems will be used throughout the building to cover the proper area of each room. The training room will have a two-way sensor positioned in the center of the space to allow for maximum coverage of the room. The following is the distribution of coverage for the sensor selected. The training room has a large amount of windows that will allow for a lot of natural light to enter the space. In order to control this light an electronic shading system will be added. Mechoshade systems are ideal for offices and large windowed rooms the same specs as the board room will be used. The same system as the boardroom will be specified.





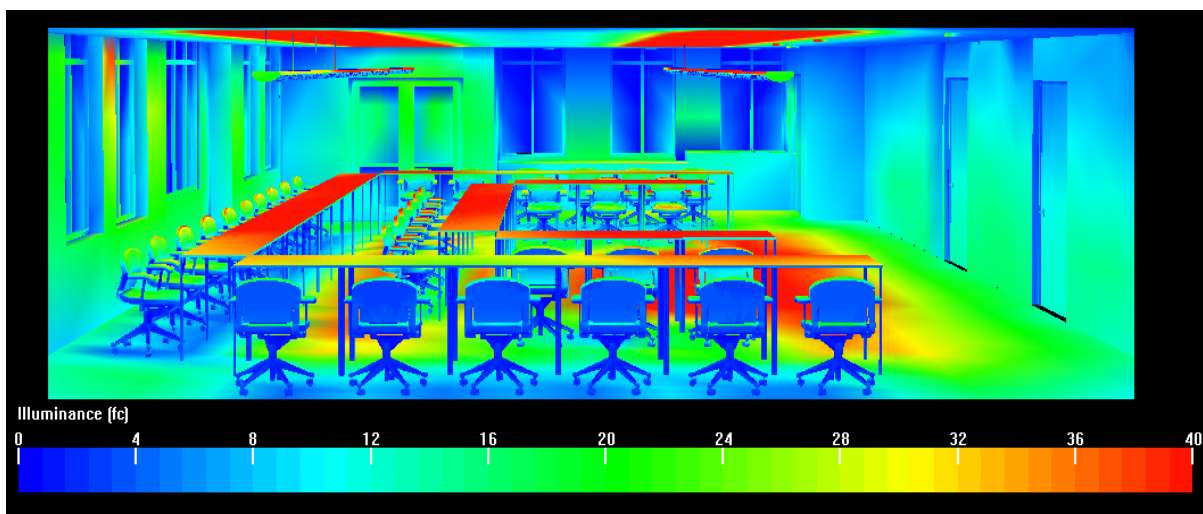
Light Analysis

Recessed System

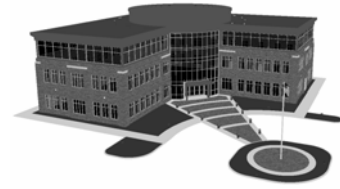


The recessed system above gives a large amount of light onto the work plane. The ceiling doesn't receive that much light making the room appear smaller than it really is. The front entrance way could use some more light. The desks are receiving more than the recommended 30 Fc by ASHREA.

Pendant System



The pendant system produces a very even distribution of light throughout the room especially on the work plane. The room's ceiling is lit very well with the indirect lighting system. The lighted ceiling will make the room appear open even with the pendants hanging down. The desks are receiving a uniform level of over 40 Fc of light.



Renderings

Recessed System



The recessed system gives a good distribution of light but creates a cloudy ceiling due to the light being directed straight down and not much being reflected back to the ceiling.

Pendant System



The pendant system gives a good distribution of light and creates a well lit ceiling due to the indirect light reflecting off the ceiling back into the room. The employees will be easily able to read and write in the work stations in this room.