Multipurpose Room

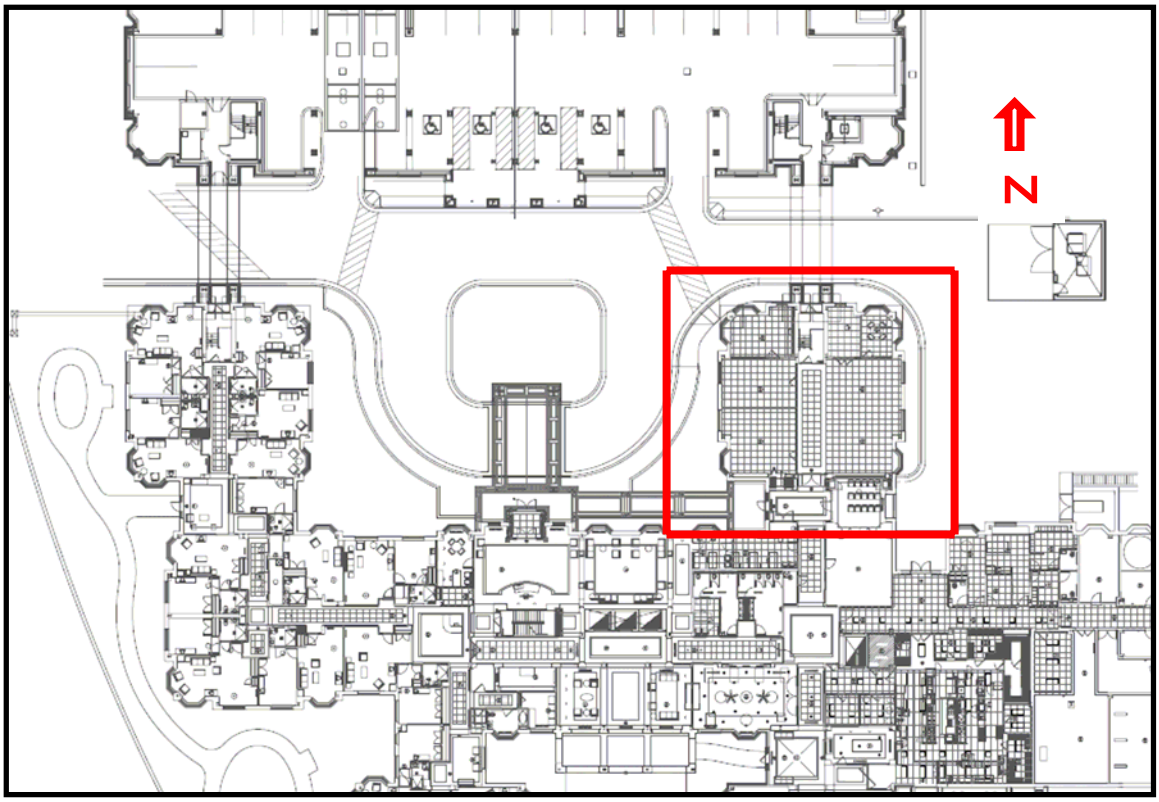


Figure 1: 1st Floor Plan – Multipurpose Room Location

Existing Conditions – General Overview

The Multipurpose Room, as the name implies, serves as a multifunctional space for the Assisted Living Facility. From this space, one can enter the craft room, meeting room, stairwell, and chapel. The room has movable partitions that allow the space to be subdivided into three smaller areas. The general lighting of the space is achieved with recessed compact fluorescent downlights. The luminaires have (2) 26-watt lamps, with a CCT (correlated color temperature) of 3500K. The luminaires make use of electronic ballasts, so lamp flicker and ballast noise are not issues. Because of the wall partitions, the luminaires are switched in their respective zones. When the partitions are opened, the luminaires can be turned all on or all off by the 3-way switches located at the north and south entrances (refer to figure 2 for details). Daylight makes its way into the space via windows, along the east and west walls. The windows are double pane, clear glass with ½" air space, and a transmittance value of 0.60.

Multipurpose Room

The surface materials of the space include:

- vinyl wall covering — reflectance = 50%
- acoustical ceiling tile — reflectance = 80%
- marble and carpet flooring — reflectance = 20%
- partitions(painted) — reflectance = 50%
- doors-wood stain — reflectance = 30%
- windows — reflectance = 10%(night), transmittance = 60%

The furnishings of the space include:

- Wooden tables — reflectance = 30%
- Wooden chairs — reflectance = 30%

Interior Elevations

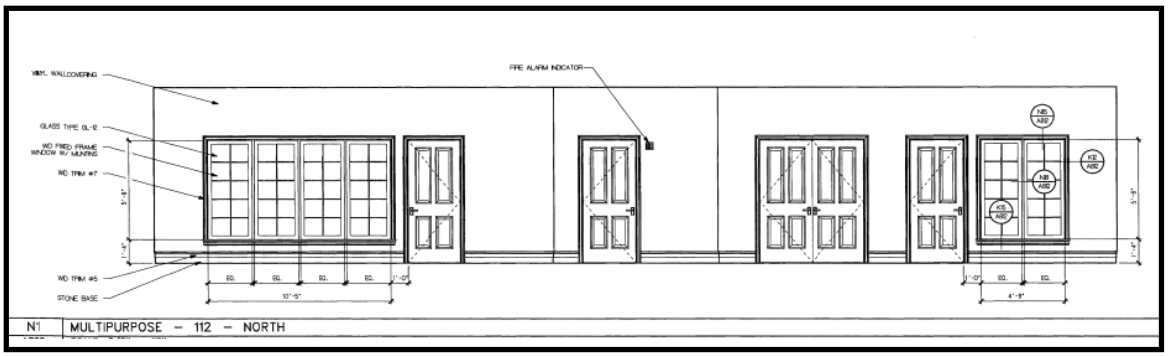


Figure 2: Multipurpose Room – North Elevation

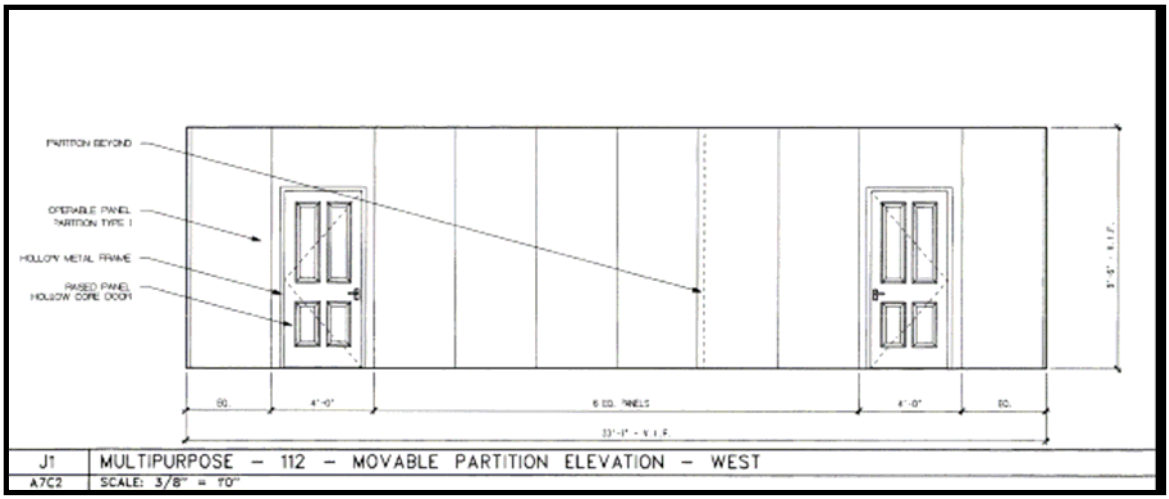


Figure 3: Multipurpose Room – Movable Partition Elevation - West

Multipurpose Room

Daylighting

As seen in Figure 3, interior glass windows are found along the north end of the room in addition to the exterior windows along the east and west sides of the room. Depending on the amount of daylight in the spaces behind the windows (craft room – west, meeting room - east), those interior windows could also provide a luminous source of daylight into the space.

Lighting Fixture Schedule						
TYPE	LAMP			VOLTS	MOUNTING	BALLAST
	NO.	WATTS	TYPE			
K	2	26	FTT26/35K	277	RECESSED	ELECTRONIC

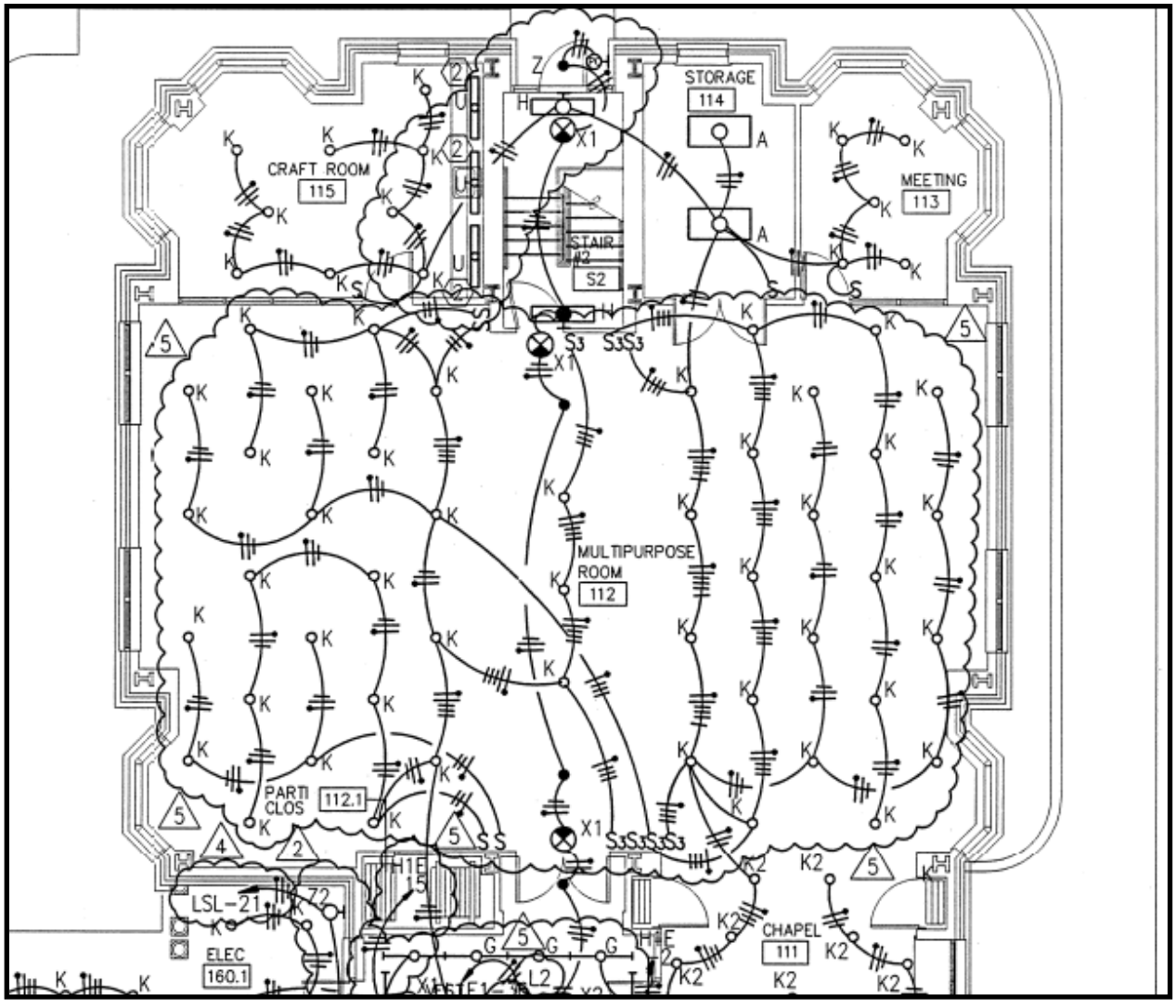


Figure 4: 1st Floor Lighting Plan

LIGHT LOSS FACTORS							
TYPE	BF	CLEANING INTERVAL	MAINTENANCE CATEGORY	LLD	RSSD	LDD	TOTAL
K	1	CLEAN (12MONTHS)	V	0.9	0.95	0.88	0.7942

Exisiting Power density - *all power densities were found using the space by space method*

- 1.33 watts/ft^2

Lighting Control

As one can see, the Multipurpose Room has zoned lighting controls for each of the individual spaces that the partitions provide. The 3-way switching can provide global all-on/all-off control, and the switches located just the partitioned areas provides control of the individual spaces.

Design Criteria - *General*

- *Source: IES: RP-28-98 – Light and the Visual Environment for Senior Living*
- ***The following design criterion is for a Senior Living Facility and the spaces that it includes. This criterion pertains specifically to the aging population and is meant to provide a basic understanding of their needs. Specific space criterion will also be developed in addition to this information.***

Elderly individuals can be divided into two categories:

- Those who suffer from pre-retinal scatter from corneal, lenticular, and citreal opacities. These persons may, and often do, have abnormal retinas. For such persons, increases in light may do more harm that good by increasing the amount of light available to be scattered.
- Those whose vision is limited by retinal dysfunction and whose acuity and contrast sensitivity are reduced. These persons often benefit from significantly higher light levels than are required for the normally sighted.

From the above two categories, it is apparent that special consideration will need to be taken when developing the design criteria and developing a lighting theme/program.

Quality of Lighting

- Freedom from glare (both disability glare and discomfort glare)
  - Reduce the amount of lighting entering the eye from areas within the central 10-15 degrees of the visual field which do not directly contribute to the visibility of the task
  - Avoid sources that are:
    - Bright
    - Large in area
    - Close to the line-of-sight
- Freedom from veiling reflections
- Freedom from flicker
- Adaptation control
  - Transitioning from light to dark is much greater the from dark to light
    - Lobbies must be brighter during the day and dimming during night time hours
- Spectral power distribution
  - "Bluer" produce less glare
  - Filtering the yellow wavelength can also increase the visual performance on contrast sensitivity and acuity tasks.
- Daylight – psychological, physical health, and energy conserving benefits
  - Brightness
    - According to the IES, older individuals need more light given their somewhat sedentary lifestyles. The lack of daylight and high light levels throughout the day can disrupt the circadian rhythms and suppress the brain's nocturnal production of melatonin. This hormone, produced by the pineal gland, is secreted during the dark phase of the daily light/dark cycle, telling the body it is nighttime. As a result, older individuals have disrupted sleeping patterns and rely heavily on sleep medications. Sleep medication can have adverse affects such as memory loss, incoordination, and breathing disorders. The problem is apparent; so much attention will be given to increasing the light levels of the spaces throughout the day. Incorporation of day lighting and electric lighting will need to be integrating to increase light levels and lower energy consumption to comply with ASHRAE and /IESNA Standard 90.1 requirement for power consumption.
  - Depression and Mood Disorders
    - Lack of outdoor light exposure and sedentary lifestyles that keep older individuals indoors are factors that contribute to the depression and mood disorders
    - There is a need for exposure to bright light conditions for both psychological health as well as physical health and a feeling of well-being.
  - Vitamin D
    - Vitamin that is crucial for skeletal health
    - Obtained from both diet and the UVA radiation found in sunlight
    - Many older individuals do not receive enough in either diet or sunlight exposure.

- Exposure to daylight and dietary supplements could help provide this essential nutrient.

- Energy Conservation
  - With careful implementation, daylight can considerable lower energy consumption and should be a top priority of the utmost importance

Illuminance Values – *referenced from Health Care Facilities IES*

Areas	Ambient Light in Footcandles	Task light in footcandles
Exterior Entrance(Night)	**10**	
Interior Entry (Day)	**100**	
Interior Entry (Night)	**10**	
Exit Stairways and Landings	**30**	
Elevator Interior	**30**	
Parking Garage Entrance	**50**	
Exterior Walkways	**5**	
Administration (Active)	**30**	**50**
Active Area (Day Only)	**30**	**50**
Visitor Waiting (Day)	**30**	
Visitor Waiting (Night)	**10**	
Chapel or Quiet Area (Active)	**30**	
Dining (Active Hours)	**50**	
Hallways(Active Hours)	**30**	
Hallways (Sleeping Hours)	**10**	

Design Criteria – Specific to the Multipurpose Room

Illuminance values

Horizontal : 50 fc – task
30 fc – ambient
Vertical : 5 fc

Appearance of Space and Luminaires

Given the multipurpose nature of the space, the appearance of the space and luminaries needs to be both aesthetically pleasing and integrated for functionality. The functions of this space could range from bingo, knitting, puzzle solving, to a large meeting area for resident activities. The

space should maintain a warm and inviting atmosphere without seeming institutional, as some large spaces may feel. The luminaire choices will have to complement the entire space as well as the individual rooms the partition provide.

Color Appearance (and color contrast)

Color appearance will be heightened by the use of high CRI lamps so that as much of the visible spectrum as possible, will be recognized.

Daylight Integration and Control

Exterior windows are on the east and west walls of the room, and will provide good daylight. The room faces the northern direction, so direct sunlight and excessive glare should not be a problem. To lower energy usage, a daylight dimming system will be investigated as a potential energy and money saving tool. Additional daylighting could be obtained from the interior windows along the northern wall of the room. Obviously it will depend on the amount of light in the spaces behind those windows, but the glass itself could provide a positive luminous contribution during the daytime hours.

Direct Glare/reflected

It will be important to avoid direct glare so that different illuminance ratios do not make the residents uncomfortable and potentially disoriented. Reflected glare will be avoided by using baffled fixtures and small sources.

Power Allowance

ASHRAE/IESNA 90.1 –	1.3 watts/ft^2
Based on space by space method	1.0 watts/ft^2 – for decorative chandelier-type luminaries or sconces or for highlighting art or exhibit

Multipurpose Room

Evaluation and critique of existing lighting conditions

To evaluate the existing lighting conditions of this Multipurpose Space, AGI32 version 1.84 was used to generate illuminance values. The surface reflectances and light loss factors stated previously were used when modeling the space.

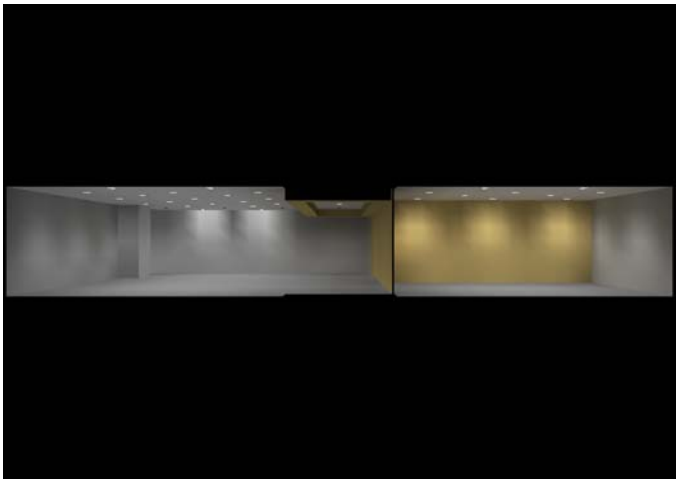


Figure 5: view looking south

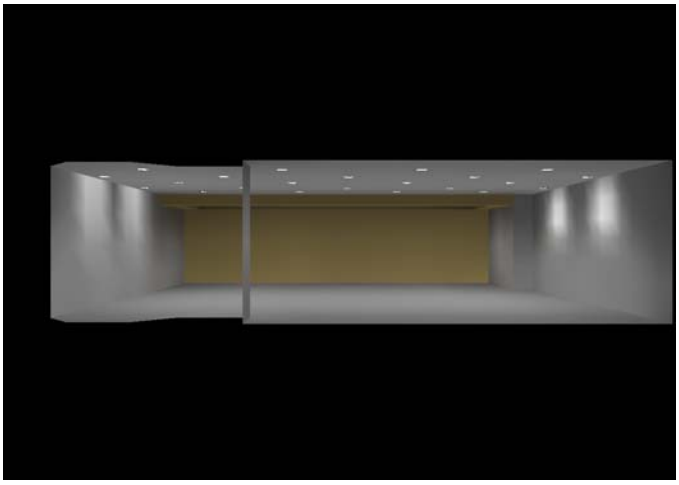


Figure 6: view looking east

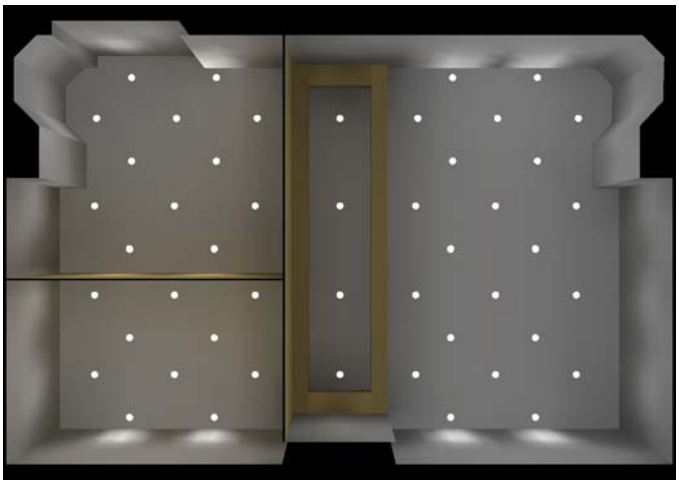


Figure 7: view of floor

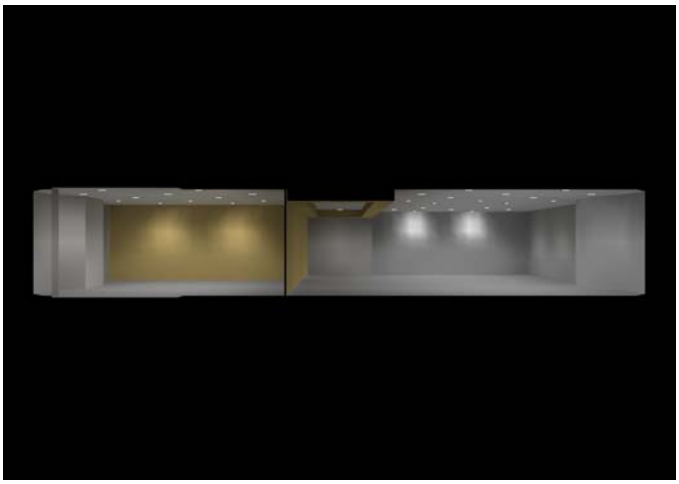


Figure 8 : view looking north

Results

A calculation grid was placed at the work plane height of 2.5 feet. The average illuminance value of the space was 53 fc, which exceeds the 50 fc the design criteria suggests. The existing lighting of the space serves the purpose of providing enough illumination. The renderings show a scalloping effect on the walls, current luminaire placement should be reconsidered. Given the function of the space, needing to be open for large gatherings, and partitioned for smaller function, the current design is not all that bad. The illuminance levels achieved are based purely on electric light, and do not consider daylight. It will be interesting to study the daylighting effect on the space and the possibility of integrating a daylight dimming system into the space. The current controls do not provide a photo sensor or motion sensor; these both will need to be implemented into the redesign of the space.

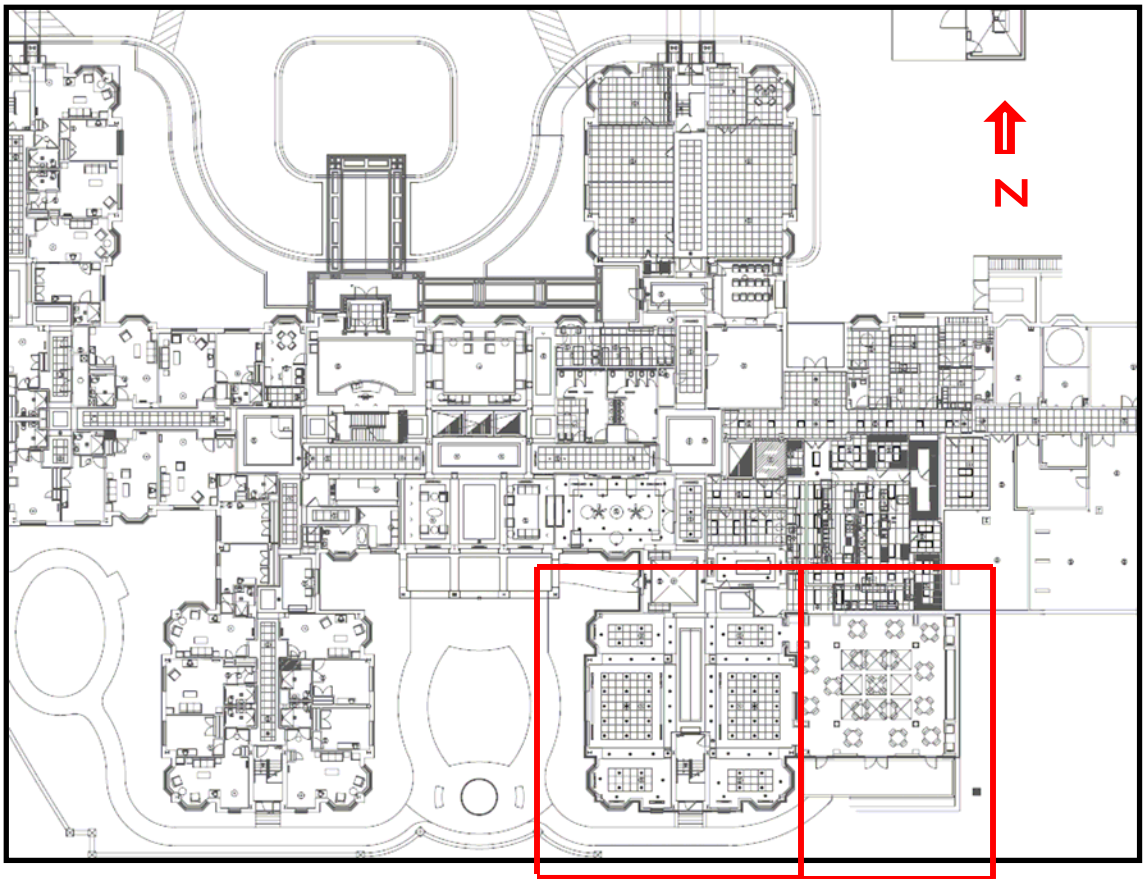


Figure 9: 1st Floor Plan – Dining Room Location

Existing Conditions – General Overview

The Dining Room of the Assisted Living Facility is a formal space that is dressed in rich materials and finishing, both of which give the residents a sense of class and style. The large dining room makes use of different ceiling heights and bulkheads to make the space feel more inviting and intimate. It should be mentioned that the existing dining room east and west elevations are the same, the addition to the dining space will expand from the east onward. The scope of the existing conditions does not include the addition, but the addition will be addressed in the redesign. Refer to Figure 9 to see the location and extents of the dining room expansion. The general lighting of the space is achieved with recessed compact fluorescent downlights. The luminaires have (2) 26-watt lamps, with a CCTof 3500K. The luminaires make use of electronic *dimming* ballasts, which allow the light levels to be lowered to provide a cozier ambience. There would be no concern of lamp flicker or ballast "hum" with these electronic ballasts. In addition to the downlighting, cove lighting provides a decorative highlight to the vaulted ceiling that is located down the middle of the dining space. There are also wall sconces that accentuate the walls and columns that offer the space a cozier feel.

Dining Room

The surface materials of the space include:

- vinyl wall covering — reflectance = 50%
- wainscot (wood stain) — reflectance = 30%
- acoustical ceiling tile — reflectance = 80%
- bulk head (painted) — reflectance = 50%
- marble and carpet flooring — reflectance = 20%
- doors – wood stain — reflectance = 30%
- windows — reflectance = 10%(night)
  transmittance = 60%

The furnishings of the space include:

- Wooden tables — reflectance = 30%
- Table clothes — reflectance = 50%
- Wooden chairs — reflectance = 30%
  (cloth backing and seat cushion)

Interior Elevations

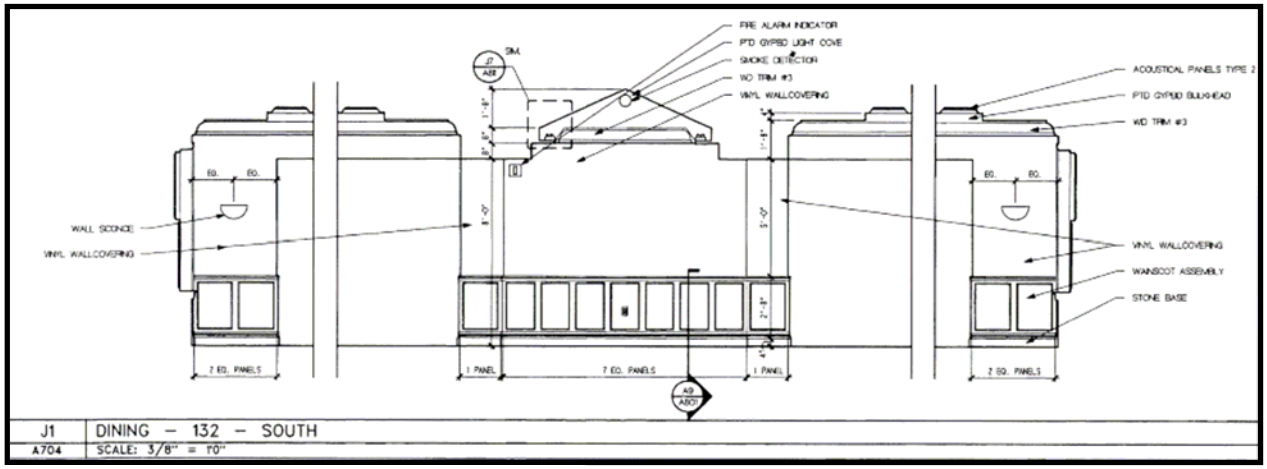


Figure 10: Dining Room – South Elevation

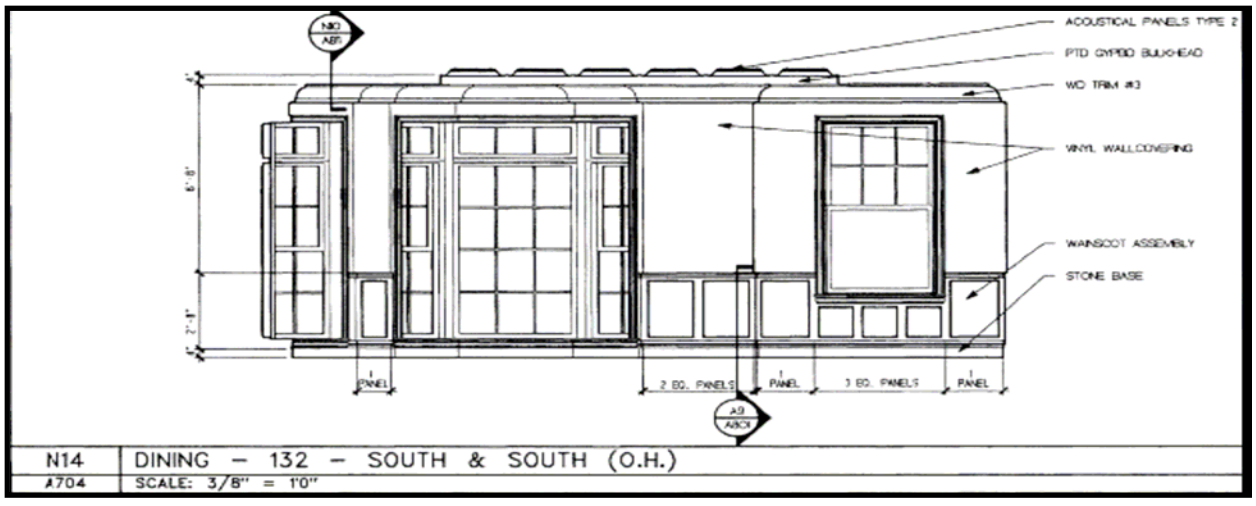


Figure 11: Dining Room – South Elevation

Dining Room

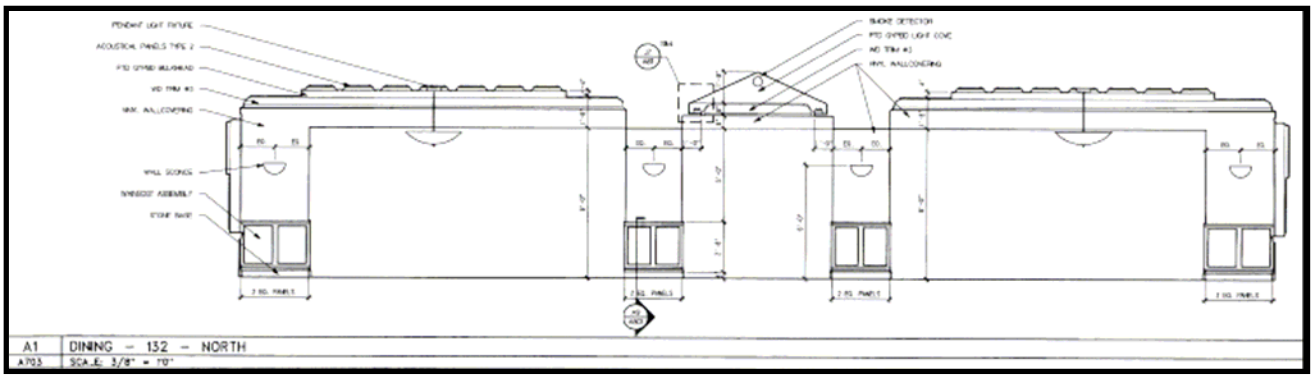


Figure 12: Dining Room – North Elevation

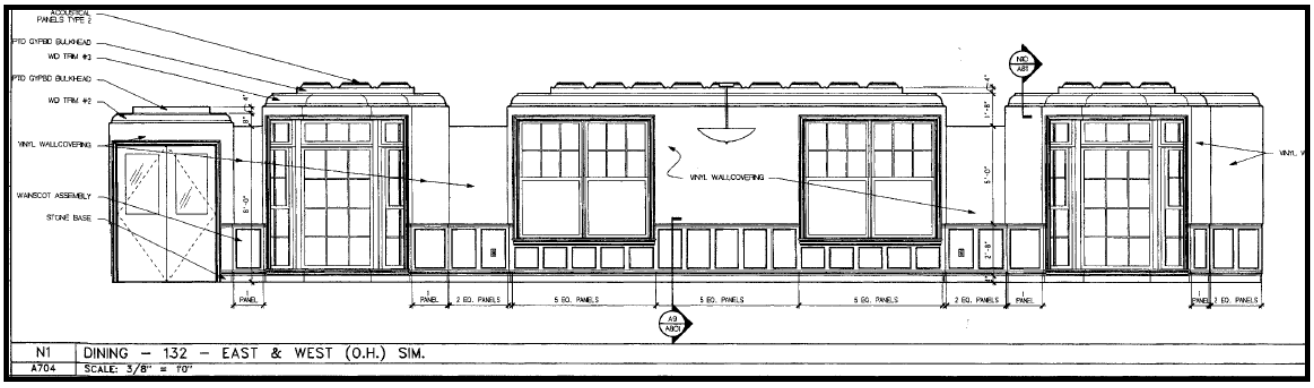


Figure 13: Dining Room – East and West Elevation

Daylighting

As seen in Figures 11 and 13, daylight can enter the space along the east and west walls, as well as the southern walls. Larger floor to ceiling windows stand in the bowed areas of the space in addition to the double width windows. With such large windows, and the fact that the dinning room is in a southern facing pod, direct glare and sunlight penetration could be issues. However, they do yield great opportunity for daylight integration and possible daylight dimming controls. As was previously mentioned in the *general* design criteria, the benefits of daylight are so important. If residents could be exposed to high levels of daylight during meal time hours, the benefits could be very positive.

Dining Room

LIGHTING FIXTURE SCHEDULE						
TYPE	LAMP			VOLTS	MOUNTING	BALLAST
	NO.	WATTS	TYPE			
G	2	32	F32/T8/35K	277	COVE/COFFER	ELECTRONIC
K	2	26	FTT26/35K	277	RECESSED	ELECTRONIC
K2	2	26	FTT26/35K	277	RECESSED	ELECTRONIC
L2	8	26	FTT26/35K	120	PENDANT	ELECTRONIC
N	1	26	FTT26/35K	277	WALL	ELECTRONIC

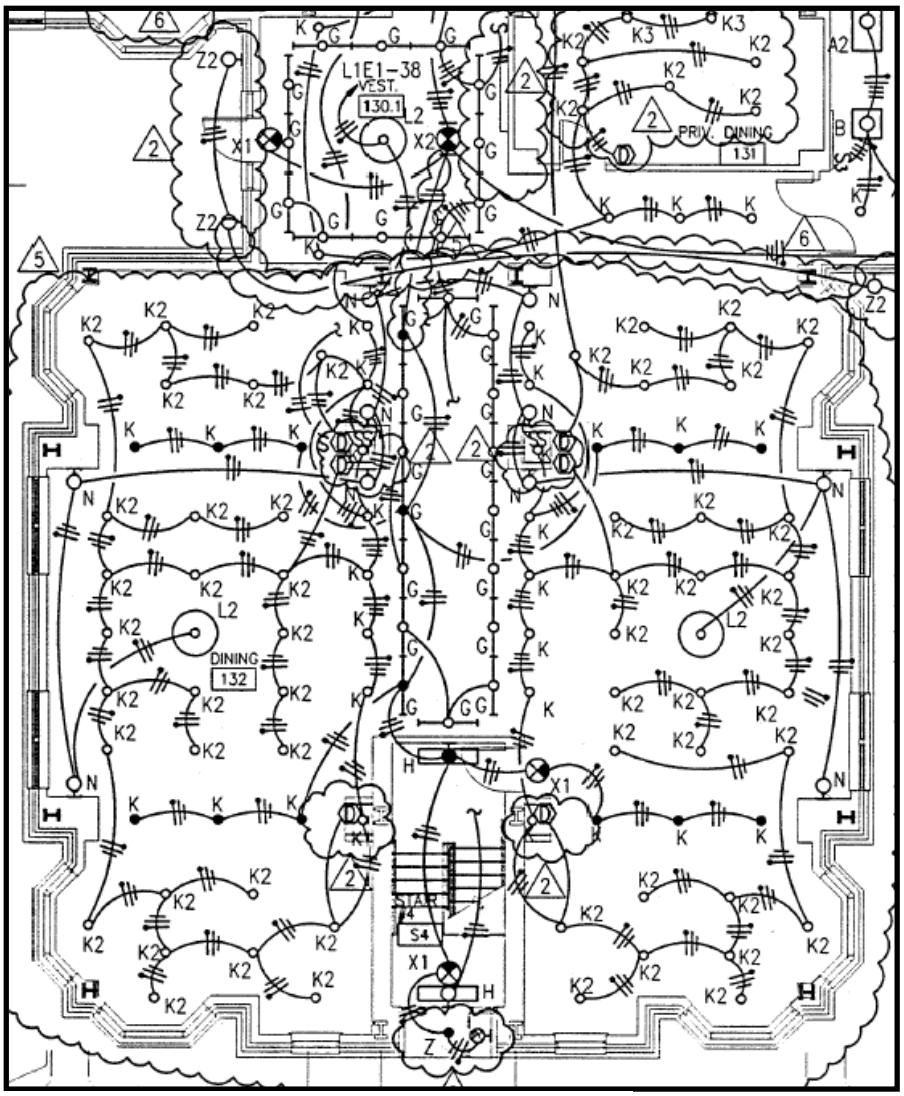


Figure 14: Dining Room – Lighting Plan

Dining Room

LIGHT LOSS FACTORS							
TYPE	BF	CLEANING INTERVAL	MAINTENANCE CATEGORY	LLD	RSSD	LDD	TOTAL
G	0.88	CLEAN (12MONTHS)	IV	0.9	0.98	0.88	0.683021
K	1	CLEAN (12MONTHS)	V	0.9	0.98	0.88	0.77616
K2	1	CLEAN (12MONTHS)	V	0.9	0.98	0.88	0.77616
L2	1	CLEAN (12MONTHS)	V	0.9	0.94	0.88	0.74448
N	1	CLEAN (12MONTHS)	IV	0.9	0.94	0.88	0.74448

Existing Power Density

- 2.124 watts/ft^2

This power density calculation assumes that all luminaries are on and running at maximum wattage output. Under dimming conditions, the power consumption could be considerably less.

Lighting Control

As one can see from Figure 14, the lighting is controlled both by switching and dimming controls. Global, all-on/all-off switching for the dining room is done at the serving columns in the northern end of the dinning room. Dimming can be control for each of the six zones at the serving columns located at the middle north and middle south locations in the dining room.

Design criteria – refer to *General* Design criteria for additional information

Tasks

The primary task of the dining room is for residents to enjoy formal meals at all dining hours, breakfast, lunch, or dinner. The illuminance levels need to be high enough so that people can move throughout the space and interpret different contrast ratios, and also have a sense of depth perception. There will need to be appropriate light levels for reading, if a menu is provided. Facial recognition and modeling will also be a relevant task the lighting system will have to provide.

Illuminance Values

Horizontal : 50 fc
Vertical : 10 fc

Dining Room

Appearance of Space and Luminaires

All residents may not have the ability or opportunity to get out and enjoy a formal dining experience as they once did when they were younger. This dining room space provides the residents with that sense of elegant dining that they may be accustomed to experiencing at their favorite restaurant. It gives the residents a chance to gather with friends and family and share the company of each other. Given the nature of the space, the feel of it needs to be formal, intimate, inviting, and calming. The architecture of the space already makes the individual sections feel cozier. The bulkheads are at a height of 8 feet and do a nice job of breaking up the horizontal dimension of the room. The bulkheads, in addition to the columns and vaulted walkway down middle of the dinner room provide very interesting architectural features for lighting. The space needs to maintain a home like atmosphere, while providing a sense of style and elegance. Luminaire choice will be important as to maintain the formal nature of the space. The luminaries should be elegant and integrated wherever possible.

Color Appearance (and color contrast)

Color appearance and contrast will be important for a number of reasons. The foremost function of the space is for eating meals. So that the food looks appetizing to the residents and they can see the color and texture contrast, reasonable light levels as well as high CRI values are important. Skin tones will also need to be warmed with a warm CCT lamp. In addition, contrast of the space needs to be addressed so that the residents have a sense of depth perception and can distinguish the chairs, tables and surroundings.

Daylight Integration and control

Windows along the east, west, and south walls provide excellent sources of daylight into the space. With the addition to the dining room space, skylights will be used to provide more daylight into the space. The addition as well as the existing dining room will be analyzed in the redesign. With any daylight integration, sun angles, sun patterns, and glare will all be issues of consideration. A daylight harvesting system will be used as an energy saving technique. Not only will the daylight help with lower energy consumption and cost, it will also provide positive psychological and physical effects for the residents (refer to *General Design Criteria for more information.)*

Direct Glare/Reflected

With the integration of daylight, direct glare could be an issue. Efforts must be made to get as much of the daylight as possible to the ceiling surfaces. In addition, those suffering from pre-retinal scatter could have trouble seeing if large luminance ratios are on the visible surfaces. Reflected glare and veiling reflection will be important to avoid when residents are looking at menus.

Dining Room

Power Allowance

ASHRAE/IESNA 90.1 - 1.5 watts/ft^2

Based on space by space method 1.0 watts/ft^2 – for decorative chandelier-type luminaries or sconces or for highlighting art or exhibit

Evaluation and Critique of Existing Lighting Conditions

To evaluate the existing lighting conditions of the dining room space, AGI32 version 1.84 was used to generate illuminance values. Rough renderings are presented to give and idea of how the light reflects of the surfaces, where "bright" spots are, as well as any issues of wall scalloping. Daylight was not considered in this model, only the existing electric light. The reason is to see how much light the existing electric light could provide at nighttime ours. Daylight conditions will be analyzed in the redesign stages of this thesis.

Figure 15: view looking west

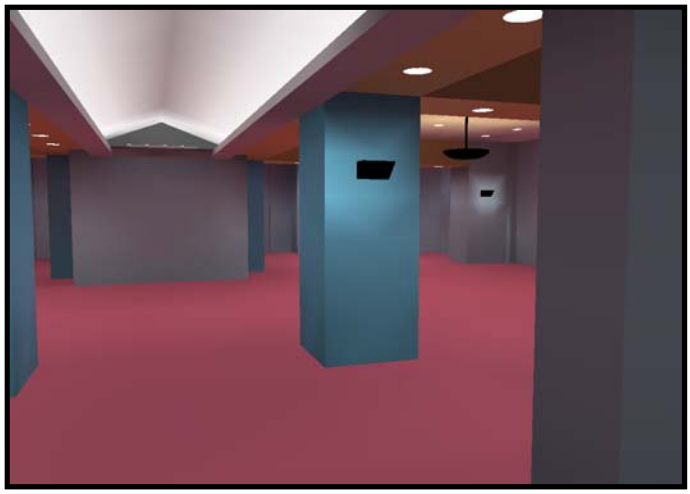


Figure 16: view south

Figure 17: ceiling view

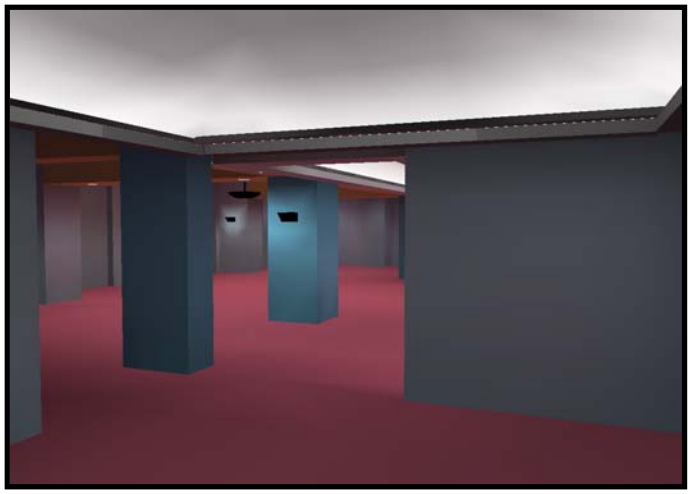


Figure 18: view from waiting area looking south

Results

A calculation grid was placed at a work plane height of 2.5 feet, where a table surface would be located. The light loss factors previously stated were used in the compilation of this data. The average illuminance in the space was about 78 fc, which far exceeds the 50 fc the design criteria suggests. The fixtures were analyzed based on the assumption that they were all on, and all running at maximum wattage. Most of the downlight luminaries have dimming ballasts, and this would help control the light levels. However, this is still an excessive amount of electric lighting. With such high illuminance values, the current design far exceeds the amount of light required on any surface. Glare from downlight luminaries could be an issue given the fact that the (2)26 compact fluorescent lamps are used per fixture. Even though the aperture is relatively small, the brightness of the source relative to ceiling brightness could present some problems. The large pendant fixtures help to balance ceiling illuminance as can be seen in Figure 17. The cove lighting is a nice high light to the vaulted ceilings. However, each cove fixture uses (2)32-watt T8 lamps. For aesthetic purpose, a source of that intensity is probably not needed. Overall, the lighting system means well, but uses far too many fixtures and goes over the allotted energy budget. The redesign of the space must consider daylight and make better use of fewer luminaries and decreased light levels, while still complying to the design criteria that has been set forth.

Lobby/Parlor

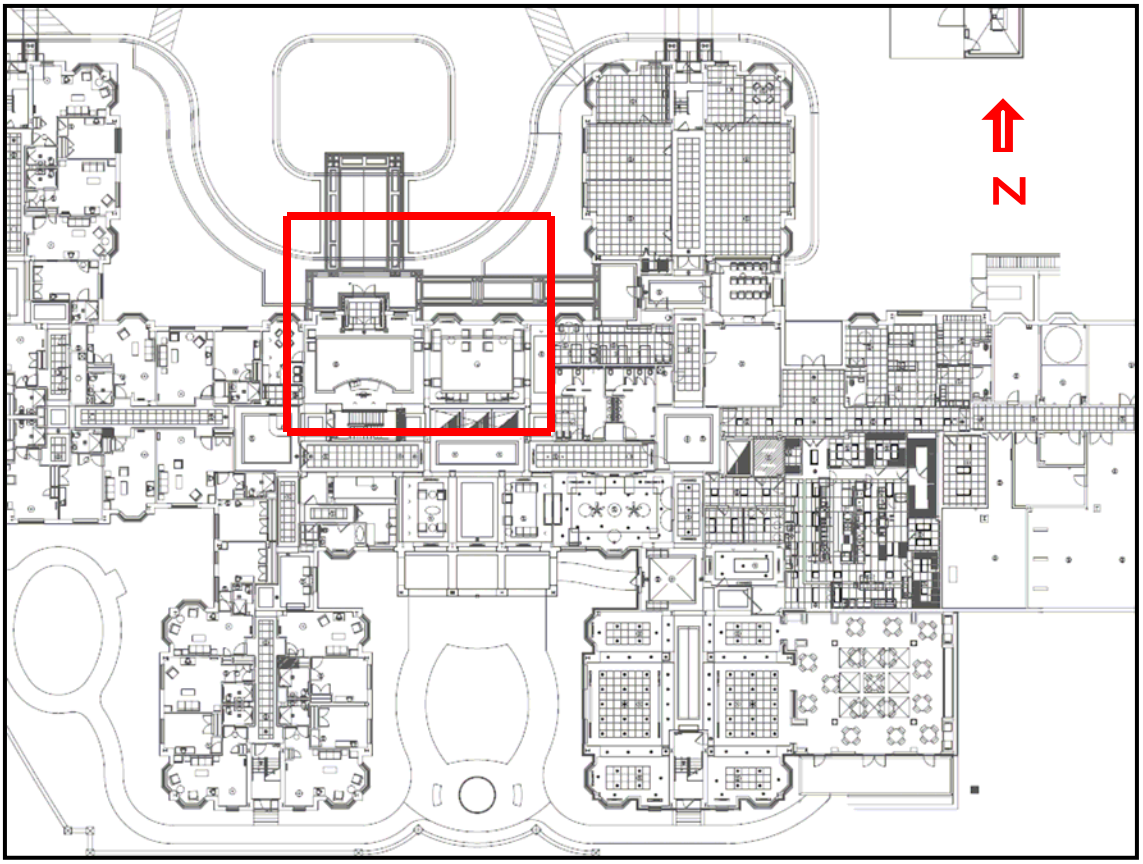


Figure 19: Lobby location

Existing Conditions – General Overview

The lobby serves as the main entrance point into the facility for guest and visitors alike. The current electric lighting for the space is achieved with recessed compact fluorescent downlights, indirect pendants, cove lighting, and wall sconces. The cove lighting and pendants provide general indirect illumination. The downlights provide light on the floor as well as highlight objects and the faces of the residents. The wall sconces provide a highlight and a more inviting feel to the space. The luminaries make use of 3500K lamps and operate at 120 and 277 volts. The cove lighting is achieved with a cold cathode source, lamp temperature is 3500K, and they operate at 100mA/FT. The system includes two 7500/100/HPF transformers. The controls of the lighting system are found in the western corridor adjacent to the receptionist station. The cathode lighting has dimmable control. Daylight can enter the space along the northern wall of the entrance. The northeastern windows are shielding by the roof that covers the walkway, so direct daylight should not be an issue.

Lobby/Parlor

The surfaces of the space include:

- vinyl wall covering — reflectance = 50%
- ceiling – painted gyp board — reflectance = 70%
- marble tile and carpet flooring — reflectance = 20%
- wainscot – wood stain — reflectance = 30%
- doors – painted — reflectance = 60%
- windows — reflectance = 10% (night); transmittance = 60%

The furnishings of the space include:

- European inspired chairs and benches — reflectance = 20%
- Reception desk – wood — reflectance = 30%
- Wooden tables — reflectance = 20%

Interior Elevations

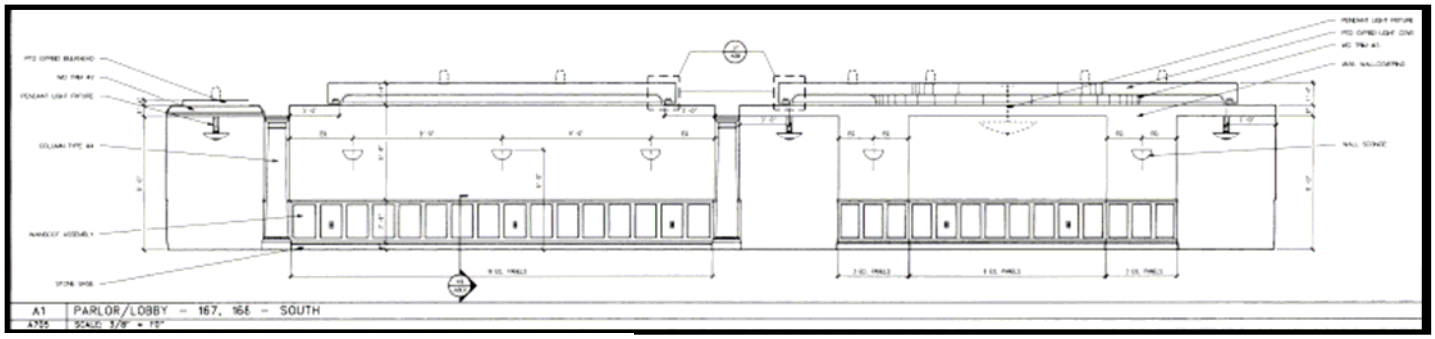


Figure 20: Lobby – south elevation

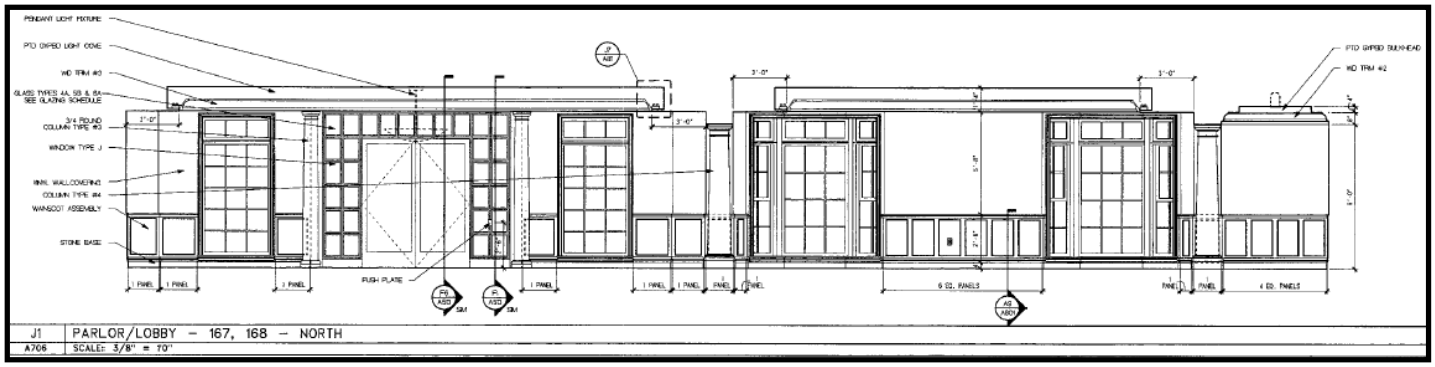


Figure 21: Lobby – south elevation

Lobby/Parlor

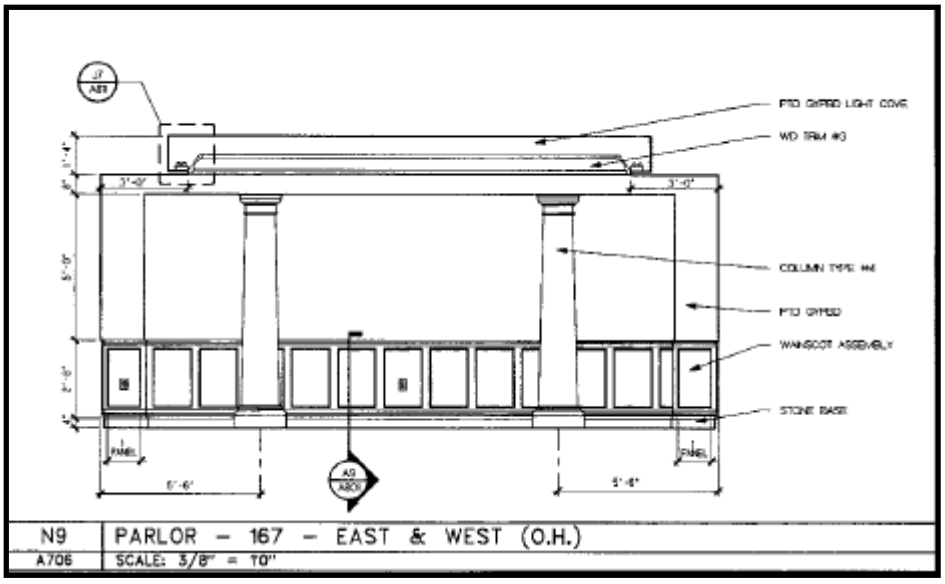


Figure 21: Lobby – south elevation

LIGHTING FIXTURE SCHEDULE						
TYPE	LAMP			VOLTS	MOUNTING	BALLAST
	NO.	WATTS	TYPE			
G	2	32	F32/T8/35K	277	COVE/COFFER	ELECTRONIC
K	2	26	FTT26/35K	277	RECESSED	ELECTRONIC
L2	8	26	FTT26/35K	120	PENDANT	ELECTRONIC
N	1	26	FTT26/35K	277	WALL	ELECTRONIC

LIGHT LOSS FACTORS							
TYPE	BF	CLEANING INTERVAL	MAINTENANCE CATEGORY	LLD	RSSD	LDD	TOTAL
G	0.88	CLEAN (12MONTHS)	IV	0.9	0.9	0.88	0.627264
K	1	CLEAN (12MONTHS)	V	0.9	0.98	0.88	0.77616
L2	1	CLEAN (12MONTHS)	V	0.9	0.94	0.88	0.74448
N	1	CLEAN (12MONTHS)	IV	0.9	0.9	0.88	0.7128

Lobby/Parlor

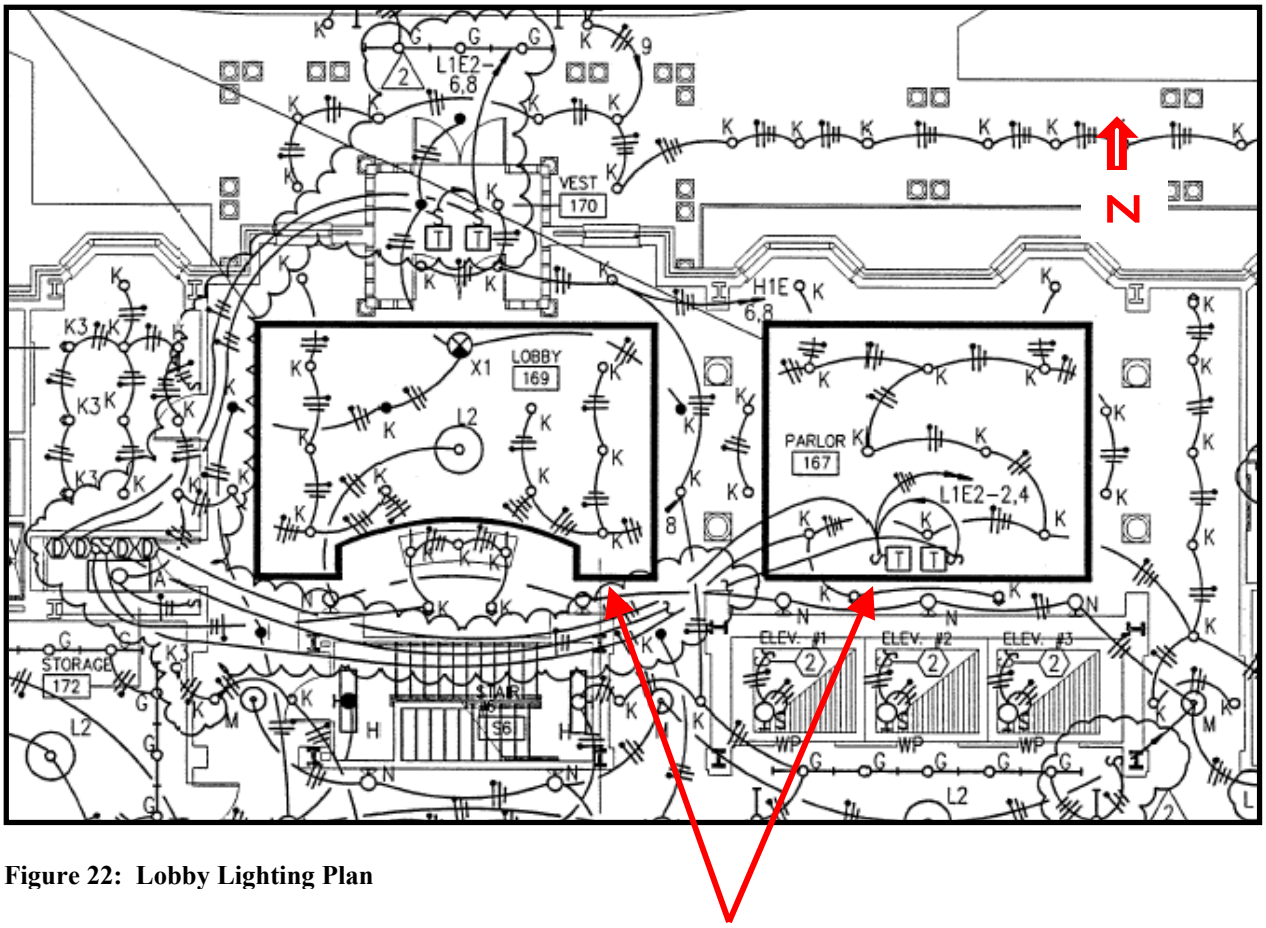


Figure 22: Lobby Lighting Plan

The cold cathode lighting is shown with black bold lines as the arrows indicate. For modeling and evaluation purposes, the cathode lighting was treated and modeled with the cove luminaire IES report. The lamp lumens for the cold cathode system are rated at 1432 lumens/4-foot strip. The power consumption is 26watts/4-foot strip. The cove IES file was modified accordingly.

Existing Power Density

- 1.6 watts/ft^2

Lighting Control

Figure 22 shows the existing lighting plan and control location. The cold cathode lighting has it own dimmable control. Downlights, pendants, and wall sconces are switched separately.

Lobby/Parlor

Design criteria – refer to *General* Design criteria for additional information

Task

The lobby space serves as a transition zone from outdoors luminance levels to indoor luminance levels. In addition, this space is where one would be greeted by the receptionist as well was a space for people to congregate and circulate. Residents may spend time visiting in this lobby, or waiting for family and friends.

Illuminance Values

Horizontal :	100	fc – interior entry (day)
	10	fc – interior entry (night)
	30	fc – visitor waiting-parlor (day)
	10	fc – visitor waiting-parlor (night)
Vertical :	10	fc – interior entry/visitor waiting (day)
	3	fc – interior entry/visitor waiting (night)

Appearance of Space and Luminaires

This is the first space that is encountered when entering the space, so the décor and feel of the space should set a standard by which the rest of the facility upholds. The assisted living facility is for long-term residents, and the warmth and comforts of home should be felt within the space. The appearance should be formal and inviting. The luminaries should be integrated into the architectural of the space, and those visible should be tasteful and elegant.

Color Appearance (and color contrast)

The lobby itself is dressed in European inspired seating, carpeting and furniture. The rich and vibrant colors need to be accentuated and brought to life with the use of correct lighting sources. Lamps with high CRI values will be used and architectural highlighting will be done wherever possible.

Daylight Integration and Control

The windows and doors of the lobby face the northern direction. Direct sunlight that could cause unwanted glare and high luminance ratios should not be a problem. In addition to facing north, the windows on the northeastern side are shielding by the roof that covers the walkway. Daylight will be studied and integrated into the space. The possible use of photo sensors and daylight dimming controls will be investigated. The integration of daylight will also help balance the transition from inside to outside light levels, so that adaptation time will be shorter.

Lobby/Parlor

Direct/Reflected Glare

Direct glare from daylight should not be an issue. Other potential glare sources are the luminaries themselves. Luminaires with smaller apertures will be used, as well as baffled lenses if it seems necessary. Ceiling luminance ratio will be balanced so that the luminaries and the ceiling beside the luminaire do not exceed a ration of 100:1. The receptionist sits in the lobby area and veiling reflections as well as reflected glare will need to be avoided due to the use of a computer.

Power Allowance

ASHRAE/IESNA 90.1 - 0.8 – 1.8 watts/ft^2
1.0 watts/ft^2 – for decorative chandelier-type luminaries or sconces or for highlighting art or exhibits

Evaluation and critique of existing lighting conditions

To evaluate the existing lighting conditions of the Lobby space, AGI32 version 1.84 was used to generate illuminance values. The surface reflactances and light loss factors stated previously in this document were used when modeling the space.

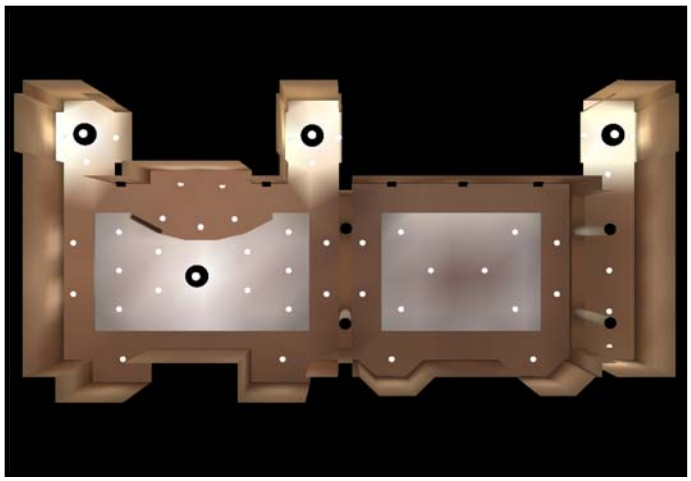


Figure 23: ceiling view

Figure 24: view looking east

Lobby/Parlor

Figure 25: view looking south

Figure 26: view looking west

Results

The lobby is the main entrance into the facility, and, a transition point from daylight to indoor lighting levels, so this space needs to consider different lighting levels during the daytime hours and the night time hours. The entry during the day should have 100 fc, achieved from both daylight and electric lighting. Due to the adaptation time the older persons need, this transition space must provide a median by which they have time to adjust to indoor light levels. At night, the space should have lower light levels, around 10 fc, so that the adaptation from the bright interior to the dark outside can occur. The outside site and exterior façade lighting can also help with this transition from inside to outside. With that said, the existing lighting layout does a nice job of accenting the architecture and putting the light on the important spaces. The illuminance levels generated by AGI32 were: an average of 62 fc on the floor, and an average of 102 on the receptionist desk. The illuminance levels do not consider daylight as a source of illuminance. The levels achieved can be thought of as those that would occur during night time hours. The entry with the existing electric lighting does not have 100 fc, but with the addition of daylight, I am confident that level could be reached. Other ambient light levels are high and could be lowered. The design criteria suggest an illuminance level of 30 fc in the parlor area, while the existing lighting provides around 40-50fc. The existing design does not have dimming on the downlights or pendants, that would be necessary to reduce the light levels during night time hours so that adaptation from inside to outside and visa versa is not too extreme.

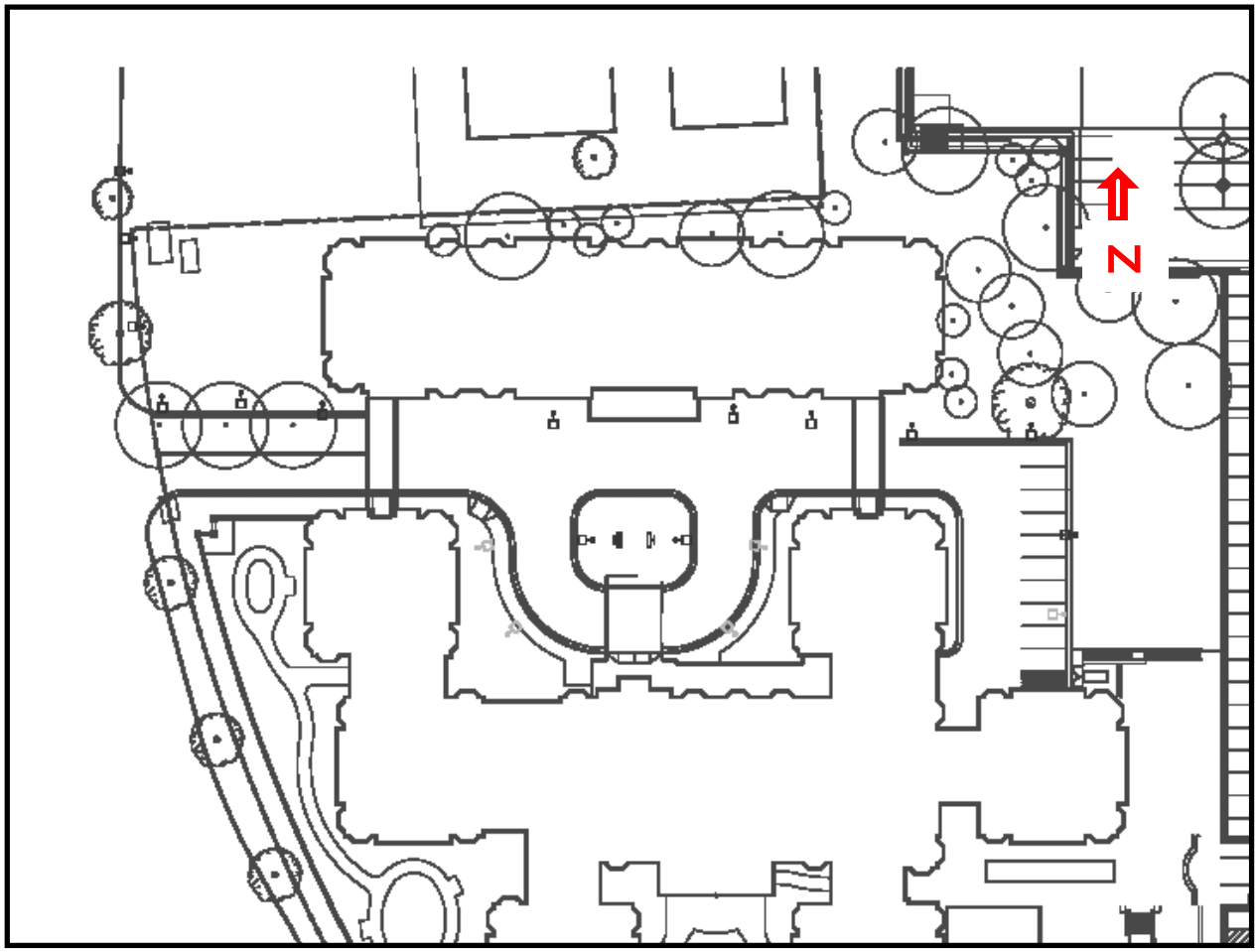


Figure 26: sight lighting

Existing Conditions – General Overview

The existing outdoor lighting is accomplished by pole-mounted fixtures, using 70-watt, Metal Halide lamps. There is no additional spot lighting provided for the building. The porte cochere and the covered walkway adjacent to the porte cochere provide lighting over the walkway. They make use of recessed compact fluorescent downlights. The luminaries have (2) 26-watt lamps, with a CCT of 3500K. The existing pole lighting fixture has a photometry that distributes light in 360-degrees. There could potential be issue with this light shining into the resident's rooms. Being that people live in the building, if any façade lighting is to be done, it would need to carefully place the light so as not to intrude into the windows of the residents.

Outdoor Area

The surface materials of the space include:

- red brick — reflectance = 20%
- white wood trim — reflectance = 40%
- painted stucco — reflectance = 30%
- asphalt — reflectance = 15%
- red brick pavers — reflectance = 20%

Exterior Elevations

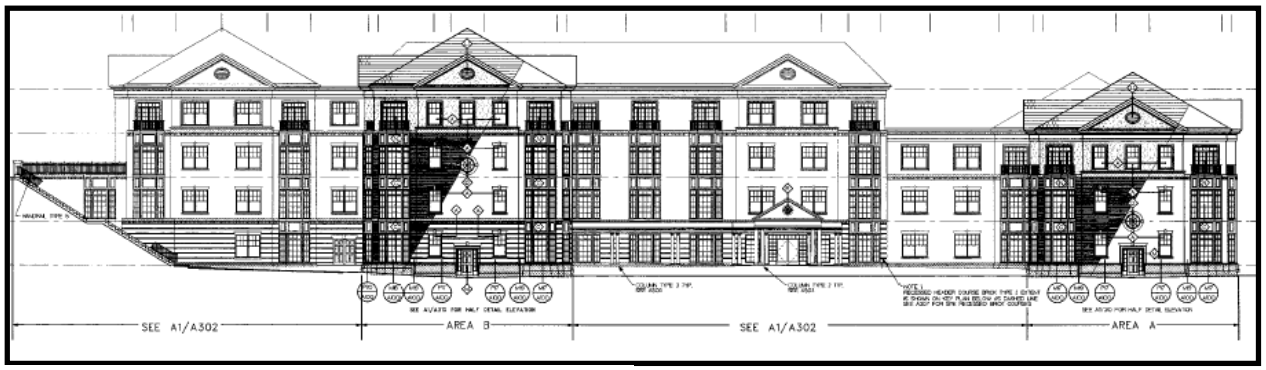


Figure 27: Building Elevation

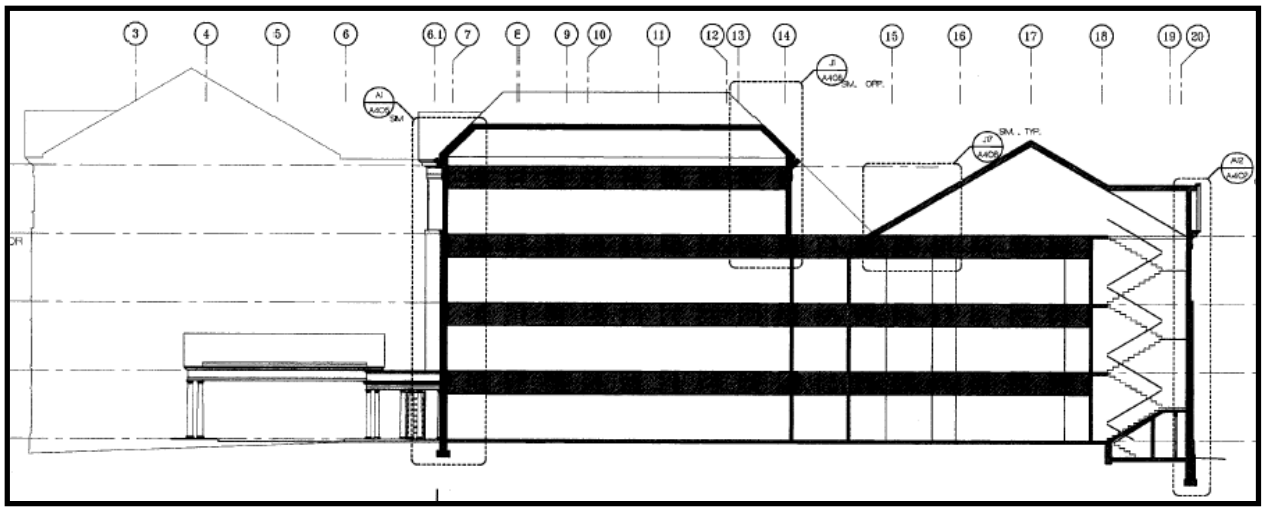


Figure 28: Section showing porte cochere

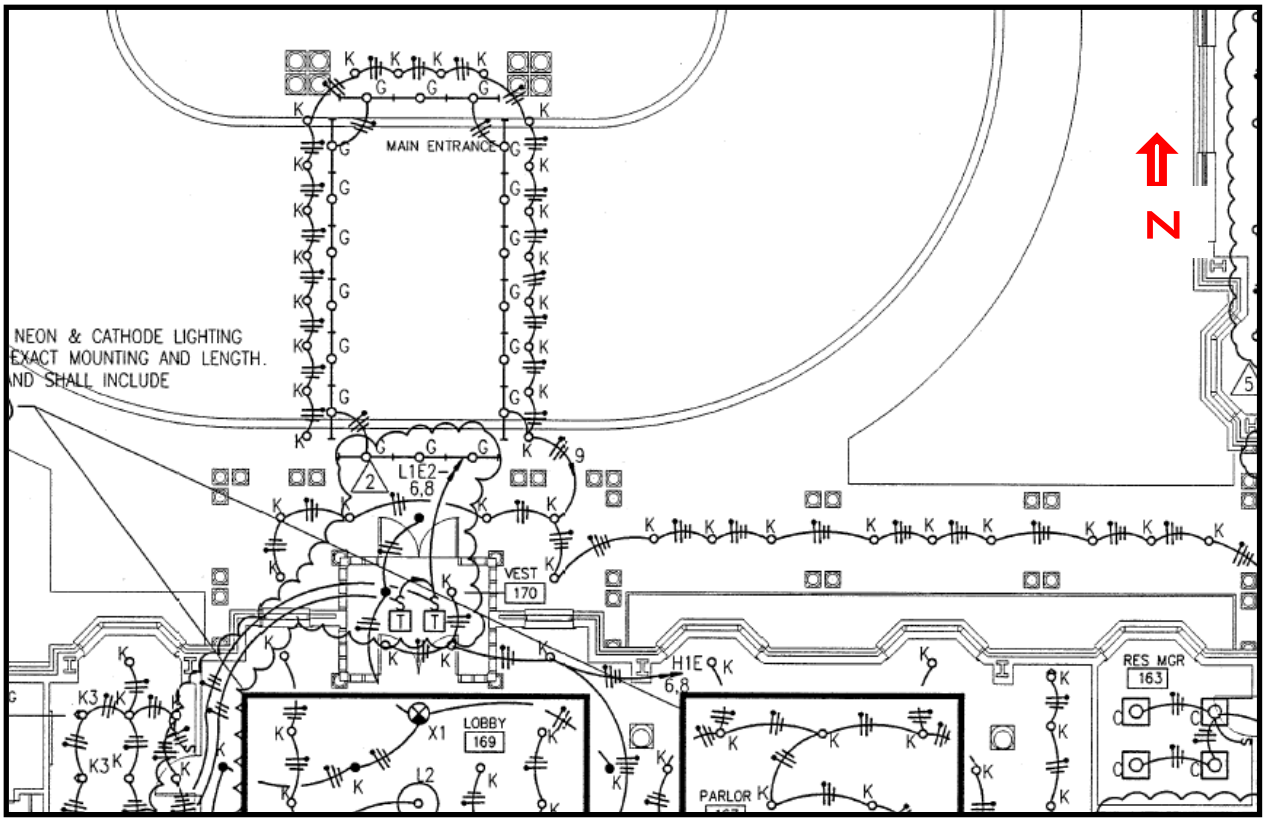


Figure 29: Lighting Plan – Porte Cochere and covered walkway

Refer to Figure 26 for the location of the Pole Mounted Luminaires

LIGHTING FIXTURE SCHEDULE						
TYPE	LAMP			VOLTS	MOUNTING	BALLAST
	NO.	WATTS	TYPE			
K	2	26	FTT26/35K	277	RECESSED	ELECTRONIC
S	1	70	100 MH	208	POLE	MAGNETIC

Outdoor Area

LIGHT LOSS FACTORS							
TYPE	BF	CLEANING INTERVAL	MAINTENANCE CATEGORY	LLD	RSSD	LDD	TOTAL
K	1	CLEAN (12MONTHS)	V	0.9	1	0.88	0.792
S	1	CLEAN (12MONTHS)	V	0.9	1	0.85	0.765

Room Surface Dirt Depreciation was assigned the value of 1.0 due to the fact that the fixtures are outside.

Existing Power Density

- 0.041 watts/ft^2

Because the area of the space is so large relative to the number of fixtures used. The exterior lighting will be addressed more on a basis of illuminance levels rather than power density. Illuminance levels will be the guide for implementing lower power consumption.

Lighting Control

The pole-mounted fixtures are controlled via photo sensors. The exterior entrance luminaries are controlled with the wall-mounted switches inside the lobby.

Design Criteria – Refer to *General Design Criteria* for additional information

Task

The main task the exterior lighting has to serve is somewhat two fold. The pole mounted lights need to provide general illumination on the roadway and walkway so that pedestrians can move about safely and have enough light to see. Given the older population of people residing in this building, the overall illumination must be higher. As is stated in the *General Design Criteria*, higher illuminance levels are needed to distinguish contrast, depth perception, and adaptation time. With that said, the overall lighting levels need to be high as well as the entry to the building.

Illuminance Values

Horizontal : 5 fc – suggested for walkways
10 fc – exterior entrance
Vertical : 1 fc – facial recognition

Outdoor Area

Appearance of space of Luminaires

The pole lights should remain elegant and prominent as the are laid against the building background. The look of the luminaire should compliment the architecture and not look industrial. The entrance to the building should be inviting, and the luminaries should be integrated within the architecture. Any building façade lighting that is to be done should hide the light source so that it is not clearly visible.

Color Appearance (and Color Contrast)

Lamps color temperature should be warm, somewhere around 3500K to look similar to other lighting throughout the building. When vegetation is illuminated, lamp choice will be critical so that the colors are accentuated and well represented. Contrast is important so that residents can differentiate differences in elevation.

Direct Glare and Reflected Glare

Residents' rooms will be in view of the outdoor lighting, as a result, the pole-mounted luminaries should have sharp cut off so that direct light does not spill into their rooms. The orientation and location of these luminaries will be addressed. Reflected glare should not be an issue given the low reflectance of the building materials.

Power Allowance

As it was stated earlier, illuminance levels will control power allowance. The lowest allowed illuminance levels will be the standard by which the outdoor lighting is controlled.

Evaluation and Critique of Existing Lighting Conditions

To evaluate the existing outdoor lighting conditions, AGI32 version 1.84 was used to generate illuminance values. Renderings were generated to evaluate where the light was hitting the façade of the building. With the needed light loss factors, illuminance values were generated based on the direct component of the light hitting the surface.

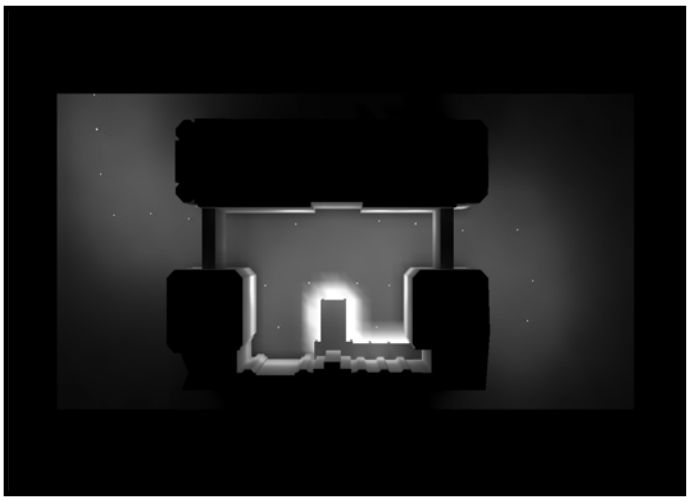


Figure 30: view looking down

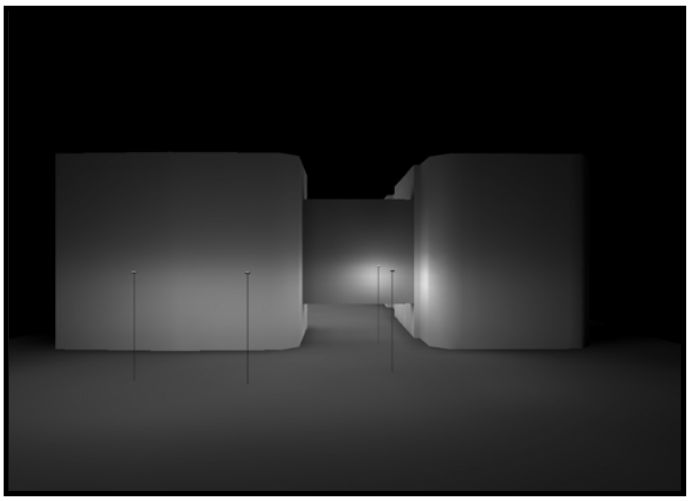


Figure 31: view looking west

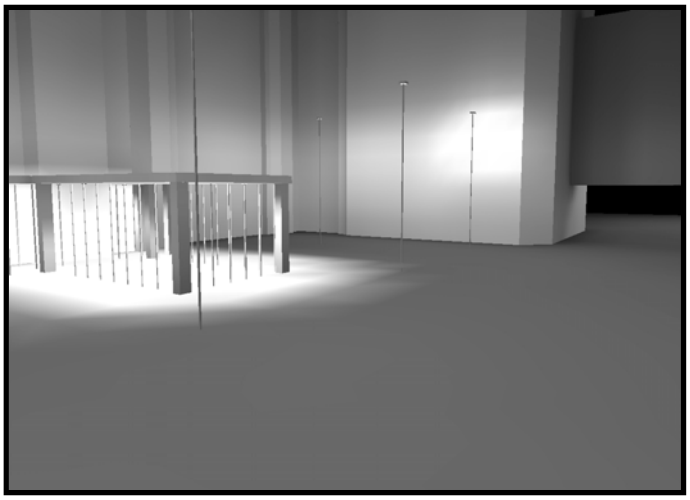


Figure 32: building entrance looking west

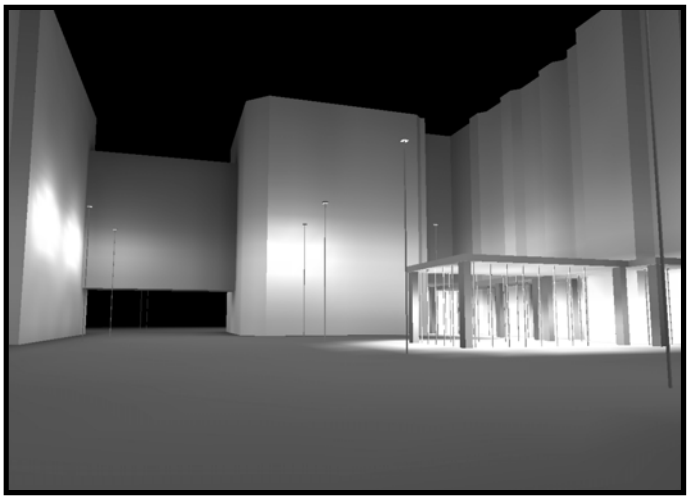


Figure 33: building entrance looking west

Outdoor Area

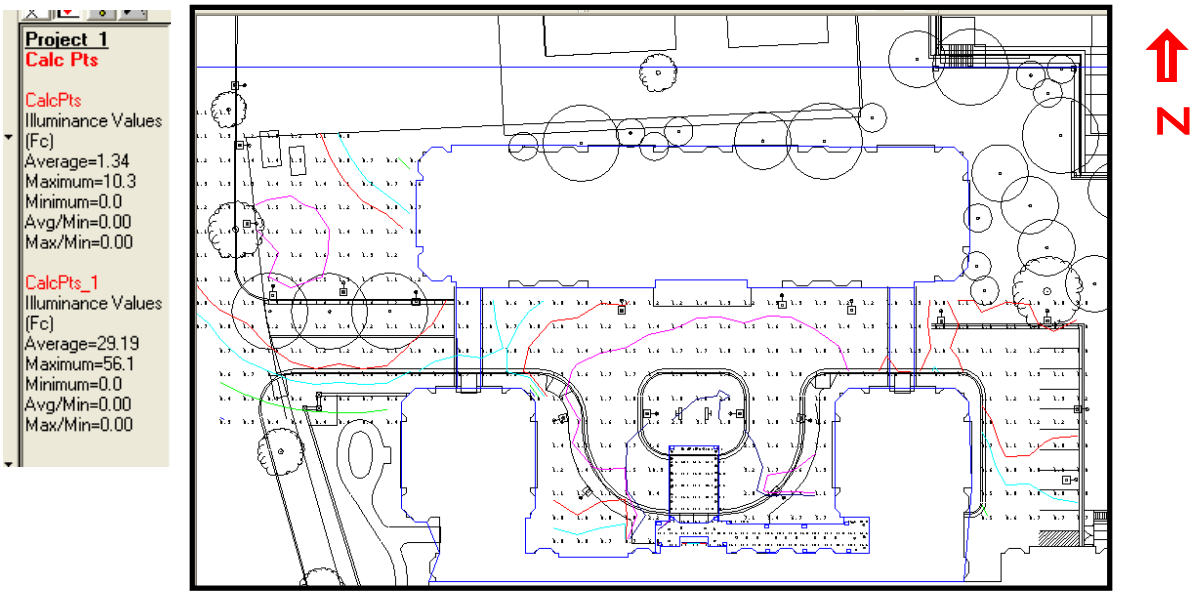
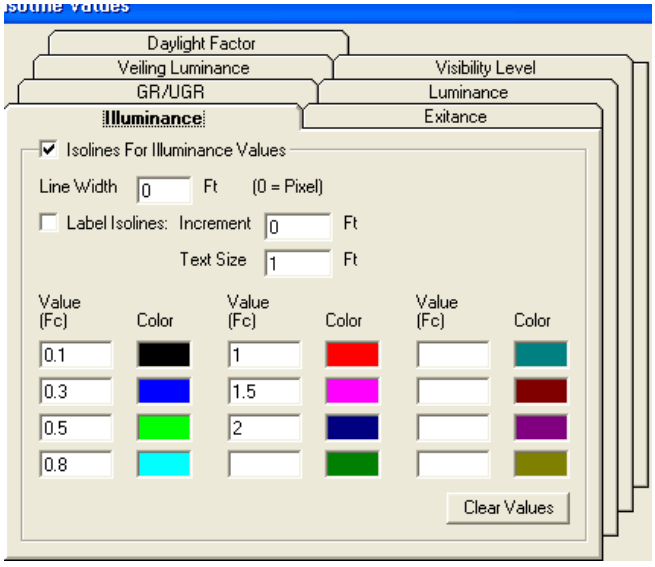


Figure 34: AGI Illuminance Isolines



The isolines of Figure 34 represent the different illuminance values generated by the existing lighting conditions. Two different calculation grids were placed on the model: one for the overall illumination of the asphalt and walkways, and one for the area underneath the porte cochere and covered walkway. The design criteria suggests and illuminance value of 30 fc at the building entry. The existing system provides 29 fc, that criterion has been reached. The overall illumination of the area is at a value of 1.34 fc. This value does seem high, even for older individuals that require more light. For most parking lots, the value of 0.2 fc is acceptable. I feel that the overall lighting system does the job of providing adequate light levels. It can be seen in the renderings that different pole mounted luminaire should be used, one with a sharp cut-off, so that excessive light does not spill into residents rooms. The building entry lighting does a good job of directing the attention towards the entrance of the building. It will be interesting to see what can be done for façade lighting to further highlight the Grand Oaks Assisted Living Facility.