

Courtyard

Overview:

The perimeter buildings of the Franklin Care Center wrap around the central two story building creating two courtyard areas. The courtyard is entered through doors either in the corridors or patient lounges; walkways guide pedestrians through the courtyard which serves as the shortest route between two sides of the Franklin Care Center. Terraces with tables and chairs, park benches, trees, a koi pond and child play area are all features located in the courtyard. While the courtyard will rarely be used by patients at night, enough illumination should be provided for safety and an aesthetically pleasing atmosphere should be created for patients to view through their windows.

Design Criteria

Main Goal:

To provide a comfortable, safe outdoor space for the elderly while limiting light pollution and reducing spill light into patient's rooms that look out onto the courtyard.

Very Important Design Criteria:

Illuminance Levels:

The courtyard will rarely be used by patients at night so only 1fc is necessary for safety. It is important to provide a minimum of 1fc on the walkway, while limiting light spilling into patient's windows that look out onto the courtyard.

Light Pollution:

To achieve a green building, light pollution and trespass should be minimal. For the courtyard, light trespass is not an issue because the building surrounds the space and blocks the light from crossing the property line. However, the lighting should be designed so that no excess light spills into the sky. To minimized light pollution, semi-cut off or cut off exterior fixtures should be used.

Direct Glare:

Exterior lighting must always be designed for safety. A safe environment must be free of glare to prevent accidents at night.

Color Appearance and Color Contrast:

Color rendering can be difficult at night; however it is essential for a courtyard. Color rendering will help ensure safety in the courtyard and make it a more enjoyable social area. HID lighting should be avoided because of its poor color rendering ability.

Peripheral Detection:

Enough vertical illumination should be provided in the courtyard to allow a person to detect nearby movement or a person getting close.

Shadows:

Shadows cast by outdoor lighting should not interfere with the safety of the space. If a shadow is cast across the walkway where a stick or stone is laying, it can cause a patient to trip. The walkway should be uniformly illuminated to reduce any hazards.

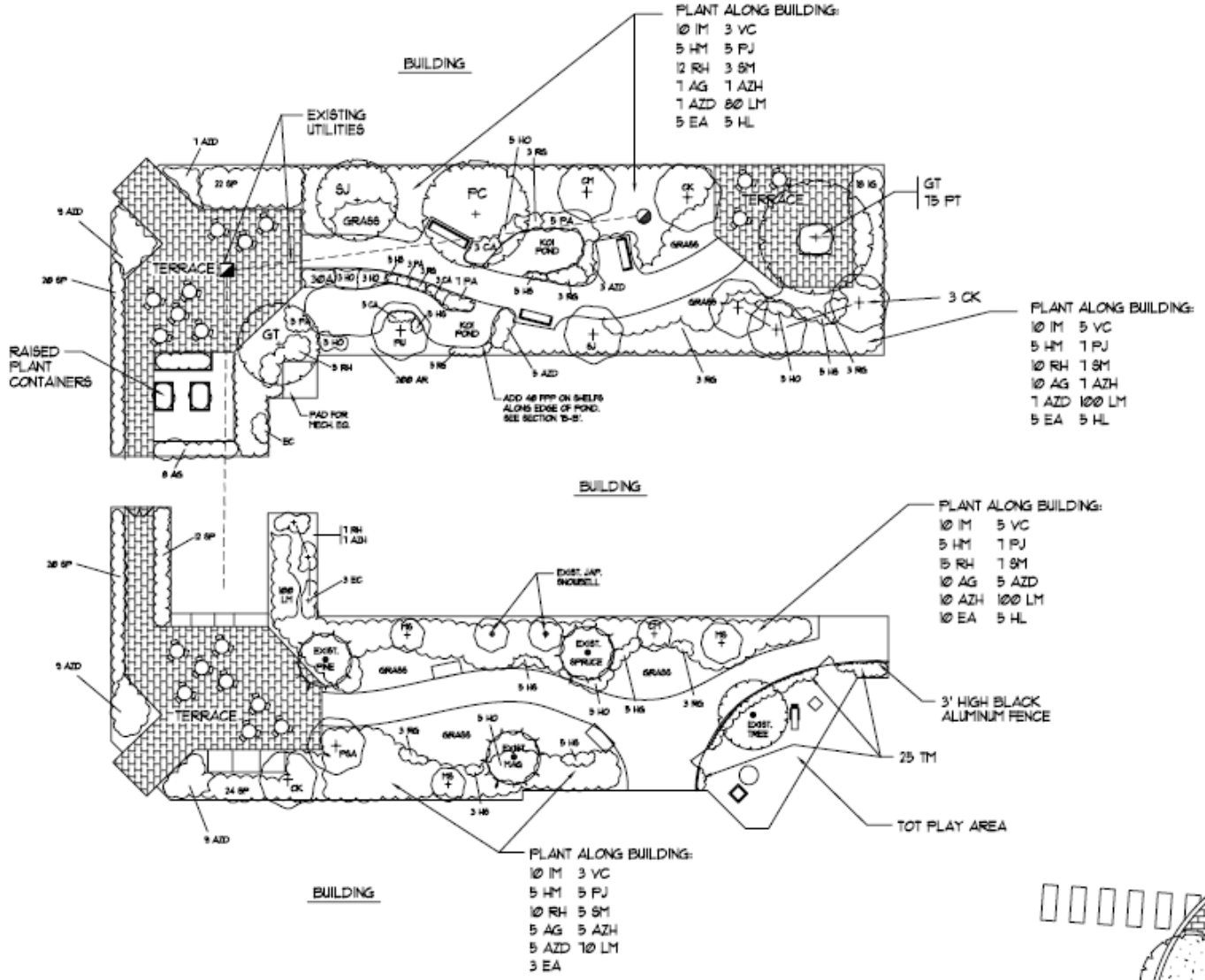
Source/Task/Eye Geometry:

Patients will be walking or traveling through the courtyard in wheelchairs or motorized chairs. Source/task/eye geometry should be provided so these tasks can be carried out with ease.

ASHRAE 90.1 Power Density: Using the space by space power density method, an exterior building walkway less than 10 feet wide should have a maximum power density of 1W/linear ft of walkway. A walkway or plaza area greater than 10 feet wide should have a maximum power density of 0.2 W/sqft. For each linear foot of building entrance an additional 20W.

Landscape Drawing

The landscape drawing below is a .pdf file received by the architect to show the landscape features of the courtyard.



Design Concept

The lighting for the courtyard was designed around LEED Sustainable Site Credit 8: Limiting light pollution. According to LEED criteria all luminaries with greater than 1000 lumens must be shielded and all luminaries with greater than 3500 lumens must be full cutoff fixtures. The use of lighting to highlight architectural and landscape elements should be either minimized or eliminated. Uplighting should be eliminated to avoid light trespass into the sky. Since the courtyard is surrounded by the buildings of the Franklin Care Center light trespass over the property line is not as issue, however light spilling into patient rooms should be minimized.

Luminaires were chosen to meet the LEED criteria. The majority of light distribution for each compact fluorescent fixture is downlight, and the LED orientation luminaries have so few lumens that light pollution will not be an issue. Pole fixtures and bollards were used to provide uniformity on the terraces and walkways. Pole fixtures were chosen on the terraces, in the play area, and near benches to provide a wider distribution of light. Sconces were used to mark each entrance to the courtyard. The small LED orientation luminaries were used to mark the perimeter of the pond as well as add sparkle to the design. These luminaries are color changing so they can change continuously or be set to one color.

Equipment Luminaire Schedule

| Fixture Label | Description | Fixture Cat No. | # | Lamp Type | Lamp Cat. No. | CRI | CCT | Ballast Type | Ballast Cat. No. | Lamps per ballast | Fixture Quantity |
|---------------|--------------------------------------|--|---|----------------------------|----------------------------|-----|------|--------------|-----------------------------|-------------------|------------------|
| F13 | Semi direct CFL bollard | Louis Poulsen SAB/1/32/CF/GX24q-3 | 1 | Triple Tube | Sylvania CFTR32W/GX24Q/830 | 82 | 3000 | DALI dimming | Sylvania QTP2x32CF/UNV DALI | 1 | 8 |
| F14 | Semi direct CFL sconce | Louis Poulsen ORW-MAX 1/32/CF GX24-q-3/4 | 1 | Triple Tube | Sylvania CFTR32W/GX24Q/830 | 82 | 3000 | DALI dimming | Sylvania QTP2x32CF/UNV DALI | 1 | 13 |
| F19 | Semi direct CFL pole mounted fixture | Louis Poulsen SATT-MAX1/32W/CF/GX24q-3/4 | 1 | Triple Tube | Sylvania CFTR32W/GX24Q/830 | 82 | 3000 | DALI dimming | Sylvania QTP2x32CF/UNV DALI | 1 | 16 |
| F20 | In grade LED orientation luminaire | Erco 38782.000 | 1 | Dynamic Color changing LED | n/a | n/a | n/a | n/a | n/a | n/a | 134 |

Visible Luminaires



F13



F14



F19



F20

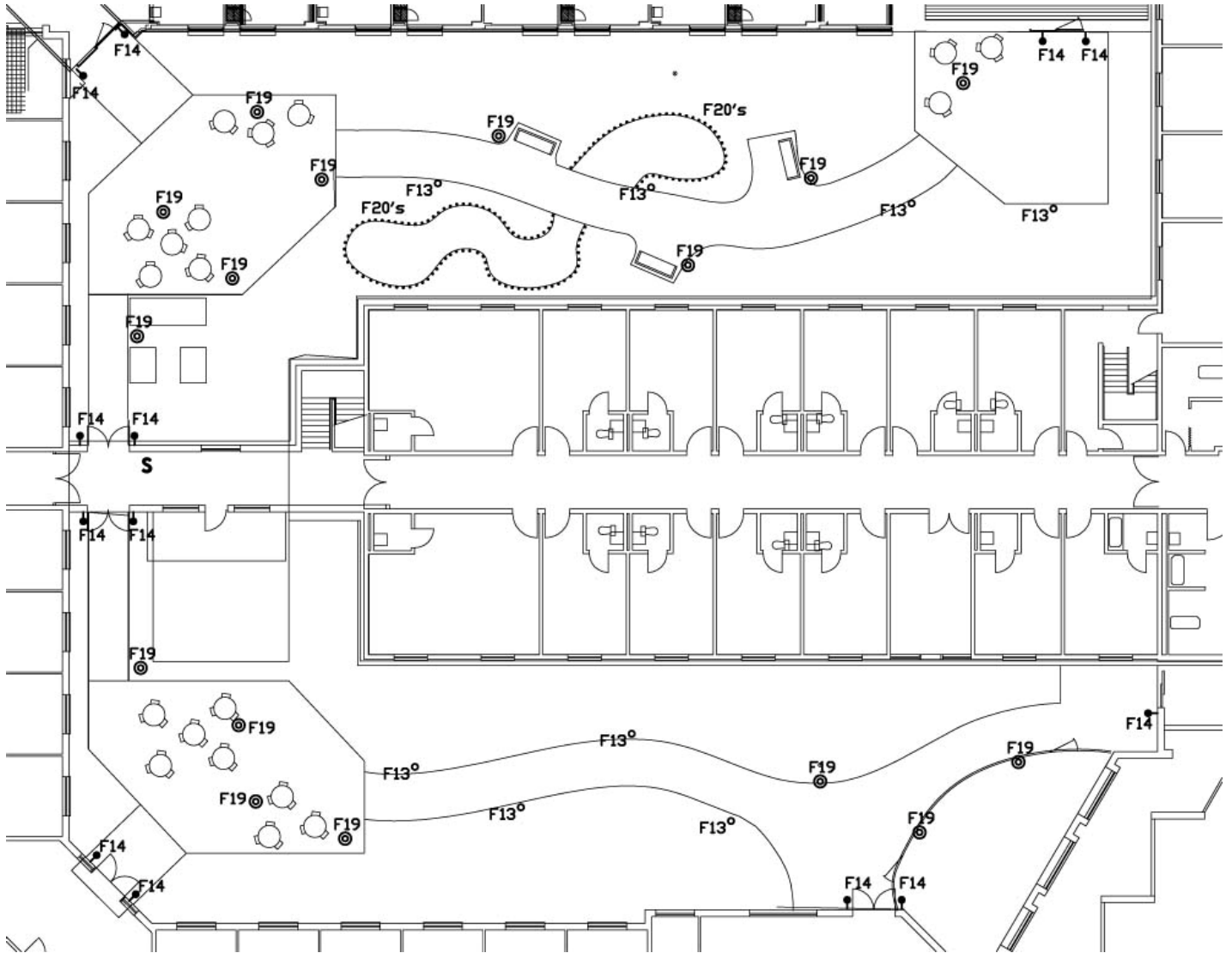
Light Loss Factors

| Luminaire Label | Maintenance Category | Cleaning Interval | Initial Lumens per Luminaire | Mean Lumens per Luminaire | LLD | LDD | RSDD | BF | Total LLF |
|-----------------|----------------------|-------------------|------------------------------|---------------------------|------|------|------|----|-----------|
| F13 | III | Dirty-12 months | 2400 | 2064 | 0.86 | 0.84 | 1 | 1 | 0.72 |
| F14 | III | Dirty-12 months | 2400 | 2064 | 0.86 | 0.84 | 1 | 1 | 0.72 |
| F19 | III | Dirty-12 months | 2400 | 2064 | 0.86 | 0.84 | 1 | 1 | 0.72 |
| F20 | II | Dirty-12 months | n/a | n/a | 1 | 0.87 | 1 | 1 | 0.72 |

DALI Equipment

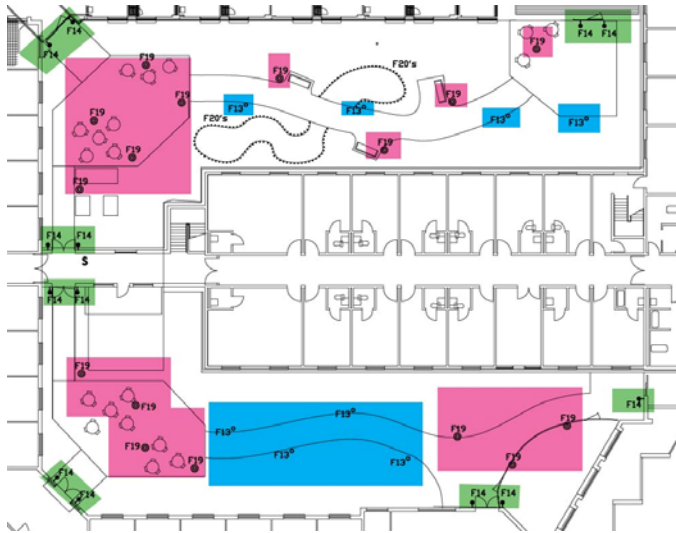
| | Description | Cat. No. | Quantity |
|---------------------|----------------------------------|----------|----------|
| Power Supply | Wattstopper ezDALI Power Supply | DPS150-2 | 1 |
| Wall Control | Wattstopper ezDALI Group Control | DLCSS4-2 | 1 |
| Photosensor | Wattstopper Photosensor | LS-301 | 1 |

Luminaire Layout



Lighting Control

All of the fixtures in the courtyard will be controlled by a photosensor. When the illuminance at the critical point falls below 10fc all of the fixtures will be turned on at full output. By turning the fixtures on at 10fc the electric light will combine with daylight to maintain a safer illuminance value for a longer period of time, making the courtyard usable for the elderly longer into the evening. A Wattstopper ezDALI Group control switch will be located inside, where the doors to each side of the courtyard meet. This switch will provide manual control for each group that will override the photosensor.

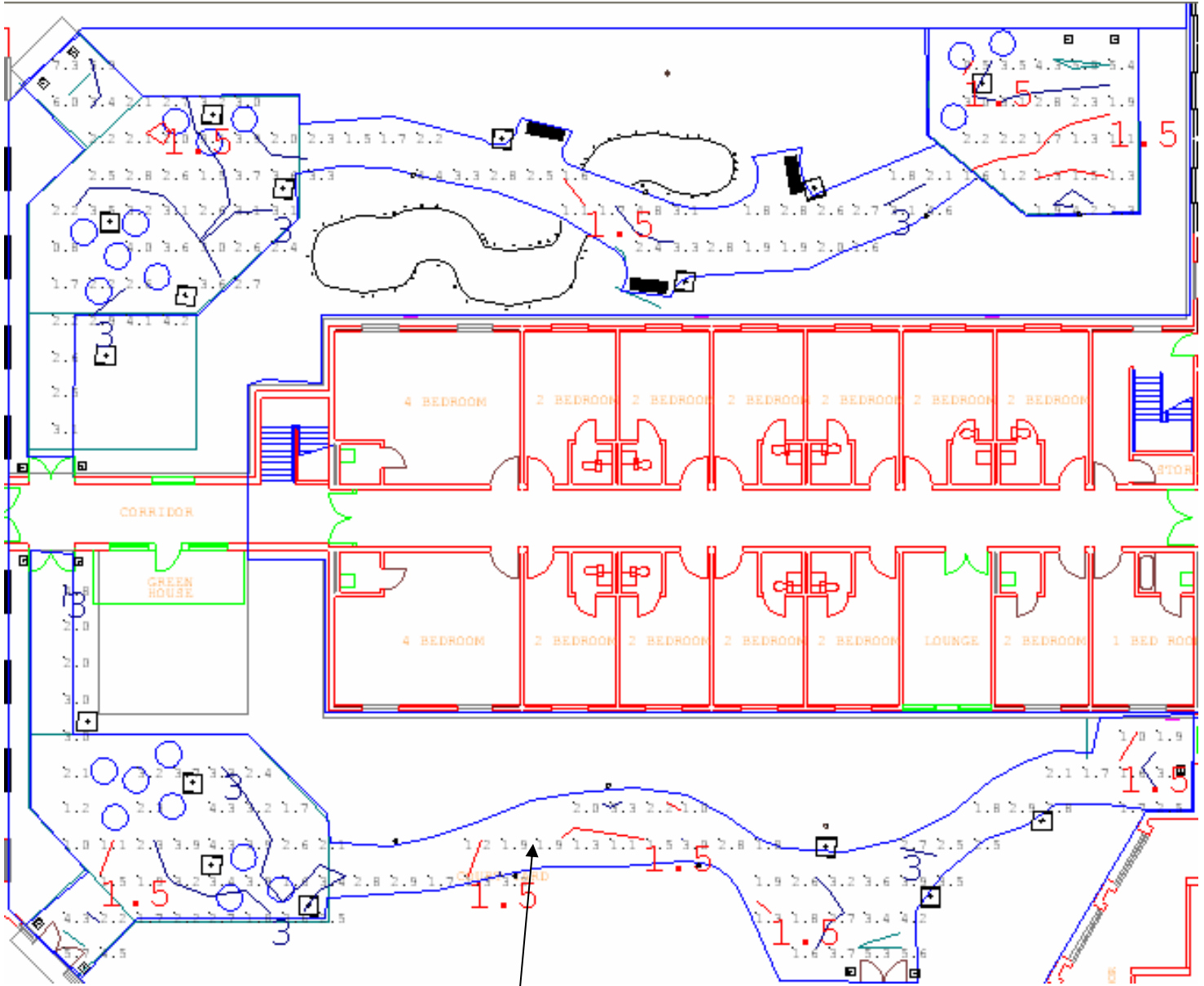


- Dali Group 1 F13 Bollards**
 - Dali Group 2 F14 Sconces**
 - Dali Group 3 F19 Poles**
- *LEDs will remain on at all times

Circuiting

| Luminaire | input watts | # used | volts | amps per ballast | total VA load |
|-----------------|-------------|-----------------------|---------|------------------|---------------|
| F13 | 35 | 8 | 277 | 0.3 | 664.8 |
| F14 | 35 | 13 | 277 | 0.3 | 1080.3 |
| F19 | 35 | 16 | 277 | 0.3 | 1329.6 |
| F20 | 0.3 | 134 | 277 | n/a | 40.2 |
| TOTAL VA | | | | | 3114.9 |
| Circuit | Load (VA) | Wire Size | Conduit | Breaker Size | |
| CY-1 | 3114.9 | 2#12 AGW, 1#12 GRD | 3/4" | 20A | |

Illuminance Values



Walkway:
Goal: Min 1fc
Avg. Achieved: 2.75fc
Max/min: 6.33

Critical Point
The critical point was chosen as a point that would not be blocked by shadowing or shading. It is a point in the middle of the walkway, not affected by any trees or shrubs.

Power Density

Below is the calculation for the allowable number of total lighting watts in the courtyard based on ASHRAE 90.1 power density for exterior building walkways.

Power density = 1 W/linear ft for walkway under 10'wide
 0.2W/sqft for walkway greater than 10' wide
 20 W/linear ft for length of each entrance

| Allowable Power Density | | | |
|------------------------------|---------|--------------------------|-------------|
| Exterior element | Measure | Allowable power per unit | Watts |
| Linear path <10ft (ft) | 301 | 1 | 301 |
| Path >10ft (sqft) | 2660 | 0.2 | 532 |
| Linear ft of entrances (ft) | 36 | 20 | 720 |
| Total Allowable Watts | | | 1553 |

Below is the calculation of actual lighting watts used in the courtyard.

| Fixture Label | Description | Lamp # | Lamp Type | Ballast Type | Lamps per ballast | Fixture Quantity | Ballast Watts | power |
|---------------|--------------------------------------|--------|----------------------------|--------------|-------------------|------------------|---------------|--------|
| F13 | Semi direct CFL bollard | 1 | Triple Tube | DALI dimming | 1 | 8 | 35 | 280 |
| F14 | Semi direct CFL sconce | 1 | Triple Tube | DALI dimming | 1 | 13 | 35 | 455 |
| F19 | Semi direct CFL pole mounted fixture | 1 | Triple Tube | DALI dimming | 1 | 16 | 35 | 560 |
| F20 | In grade LED orientation luminaire | 1 | Dynamic Color changing LED | n/a | n/a | 134 | 0.3 | 40.2 |
| | | | | | | | Total Watts | 1335.2 |

Allowable power = 1553 Watts

Achieved power = 1335.2 Watts

Actual power density is approximately 14% below ASHRAE90.1

Conclusions

The lighting design for the courtyard of the Franklin Care Center meets the criteria to earn LEED Sustainable Site Credit 8: Limiting Light Pollution, while providing a safe environment at night. The compact fluorescent fixtures used are all shielded fixtures with less than 3500 lumens. Uplighting was avoided and the LED orientation luminaires used to highlight the koi pond are the only fixtures used to enhance a landscape feature. While the courtyard will rarely be used after dark, more than the 1fc of illumination necessary for safety is provided. However the lighting will make the courtyard usable for the elderly later into the evening, and create an aesthetically pleasing atmosphere for the patients to view through their windows.