

Technical Report #1

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Lighting/ Electrical Option
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[GEISINGER CRITICAL CARE BUILDING]

[1010 EAST MOUNTAIN RD.]

[PLAINS, PA]

Executive Summary:

The purpose of this report is to describe the existing general lighting conditions of the Geisinger Critical Care Building and make judgments on its effectiveness. Special attention is paid to four spaces in particular with each space broken down through multiple means of analysis including space and luminaire description, design criteria consideration, digital model development and lighting performance calculation. The content of this report will serve as a guide for future study of the spaces and will guide redesign decisions in each of the four spaces.

The four spaces considered in the following document include:

1. General Processing Office
2. Operating Suite #1: Heart
3. Main Waiting Area/ Corridor
4. Parking and Patient Drop-off

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Space 1 (Large Work Space): General Processing Office

Description: For the purposes of this project, I will be using a currently unassigned space (according to construction documents) as a processing area/ office space. The space is located on the second floor of the GCCB and will be used for typical office use (i.e. filing, paperwork, computer processing etc.). Materials information for this space is selected to match similar, smaller spaces throughout the building.

Dimensions: Approximately 3600 square feet

Existing Lighting Conditions:

Fixture Types (Number of Fixtures):

Type FA (11 luminaires)

TYPE	DESCRIPTION	LAMPS	BALLAST(S)/VOLTAGE	DESIGN MAKE
FA	4' LONG SURFACE STRIPLIGHT: TWO LAMP, INDUSTRIAL SPECIFICATION GRADE STRIPLIGHT CONSTRUCTED OF 20 GAGE STEEL, NOMINAL 4' LONG AND PENDANT MOUNTED AT HEIGHT INDICATED ON DRAWINGS. EQUIP WITH SOLID STEEL ENDPLATES. FINISH SHALL BE MINIMUM 88% REFLECTANCE WHITE ENAMEL. EQUIP WITH WIREGUARD	(2) F32T8	(1) ELECTRONIC, HPF, LESS THAN 10% THD 120/277 VAC	COLUMBIA LIGHTING CS SERIES, METALUX STN SERIES, H.E. WILLIAMS' SERIES 77, LITHONIA HEAVY DUTY UN SERIES, LSI MIDWEST LIGHTING CHANNEL 52 SERIES

Lighting Controls:

Lighting controls are typical, 2-pole switch type, wired for one-level three-way switching.

Materials Summary:

Floor (Primary):

Carpet tile: Lee’s Modular DN073 textured blocks; color – 411 Alpine Valley

Reflectance: 0.18 (assumed)

Walls (Primary):

Ceramic paint: MDC general wall/ soffit paint; color – 902MC (white)

Reflectance: 0.72 (assumed)

Ceiling (Primary):

Acoustical Ceiling Tile: Armstrong Dune square lay-in; color – white; number – 1851; size – 24”x 48”; grid – prelude 15/16” exposed tee grid, white

Reflectance 0.8 (assumed)

Spatial Analysis:

Lighting design in this space is not nearly sufficient for the type of occupancy I anticipate. The centralized location of this space is ideal for a typical office-type patient processing area and its size should ensure the fact that it will be used for some purpose along these lines. IESNA Chapter 10 recommends that, for open office plans with intermittent VDT use, a minimum of 50 footcandles horizontal illuminance. The table below is a summary of an AGI32 analysis performed on this space under the current design conditions and it is obvious that the horizontal illuminance level present requires a drastic redesign of the current system.

AGI 32 Analysis of General Processing Office					
	Reflectance	Average Illuminance (fc)	Maximum (fc)	Minimum (fc)	Max/Min
Ceiling	0.8	13.48	86.3	1.4	61.64
Walls	0.72	11.32	26.7	1.2	22.25
Floor	0.2	14.34	23	1.3	17.69
Workplane	n/a	17.5	41.9	0.9	46.56

Light loss factor for the values in the table above were determined as follows:

$$[LLF = BF \times LLD \times LDD \times RSDD]$$

Ballast Factor (BF) = 0.95 for fluorescent luminaires

Lamp Lumen Depreciation (LLD) = 0.82 for high-output fluorescent lamp

Luminaire Dirt Depreciation (LDD) = 0.95 for Category II luminaire, clean, 12 month cycle

Room Surface Dirt Depreciation = 0.975

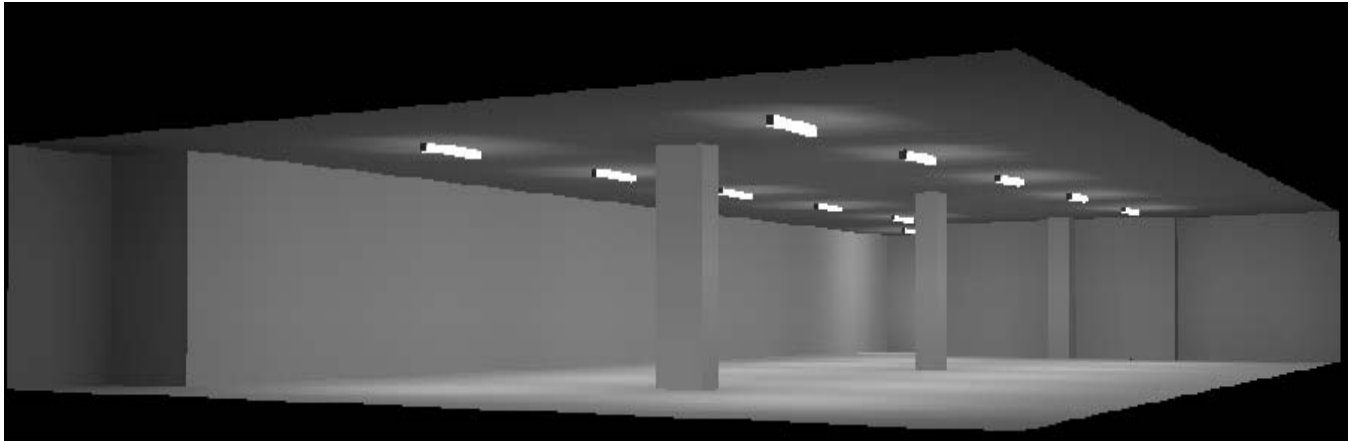
- for RCR = 1.05; cavity height = 5'-6", room width = 39', room length = 79'
- for percent expected dirt depreciation (%EDD) = 12.5%; clean @ 12 months
- for luminaire distribution type direct

$$LLF = 0.95 \times 0.82 \times 0.95 \times 0.975$$

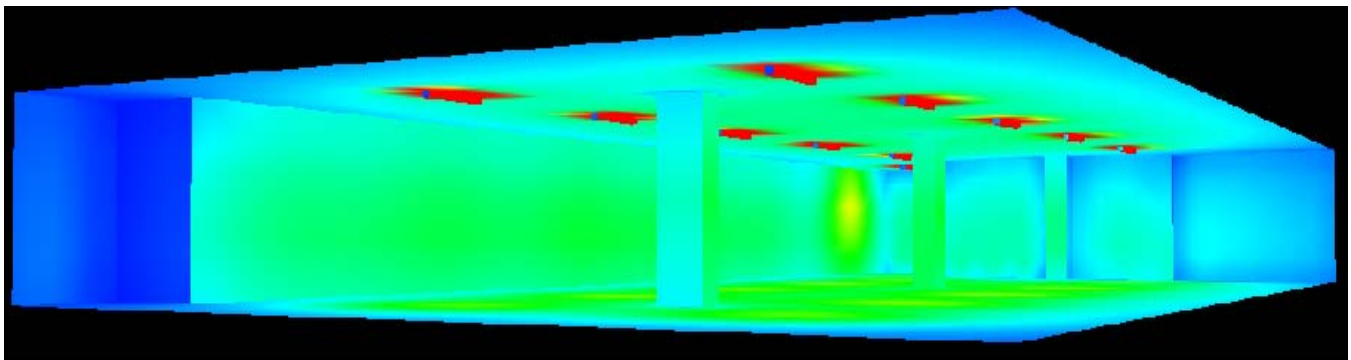
$$LLF = 0.7215$$

In addition to this discrepancy, I feel that the design of the system should pay close attention to Flynn studies regarding the effect of bright, even walls on opening up a space. Too many patterns of shadow, along with darkness at ceiling and wall joints causes the space to feel very enclosed and uninviting. The fact the space has no exterior windows or other openings also plays into the enclosed feeling inside the processing office. This concept and other design considerations are discussed in further detail in the following pages.

Pictured below are radiosity and pseudocolor renderings developed in AGI32 as well as architectural and lighting plans taken from construction documents.

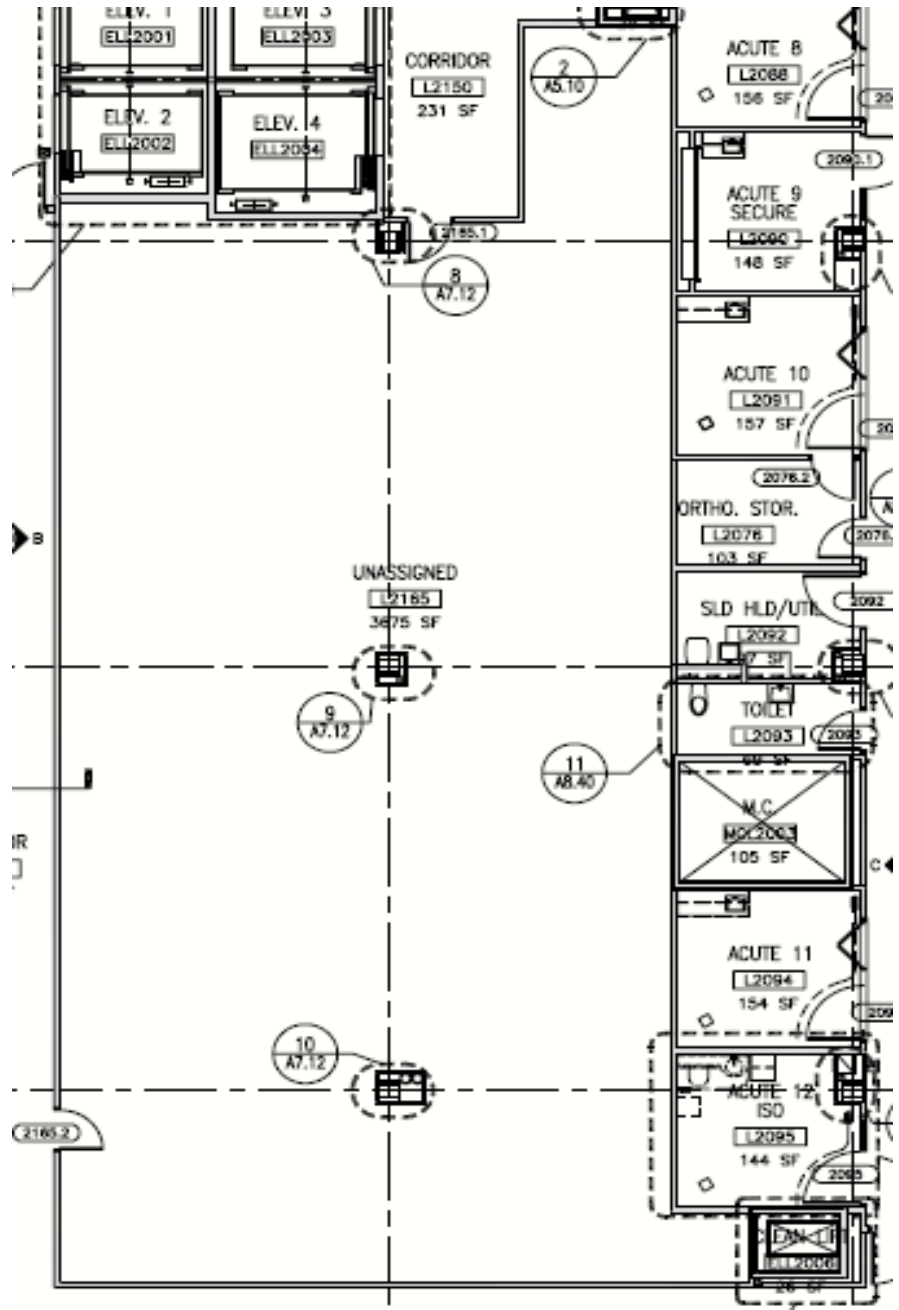


The image above is a radiosity image of the General Processing Area developed in AGI32.



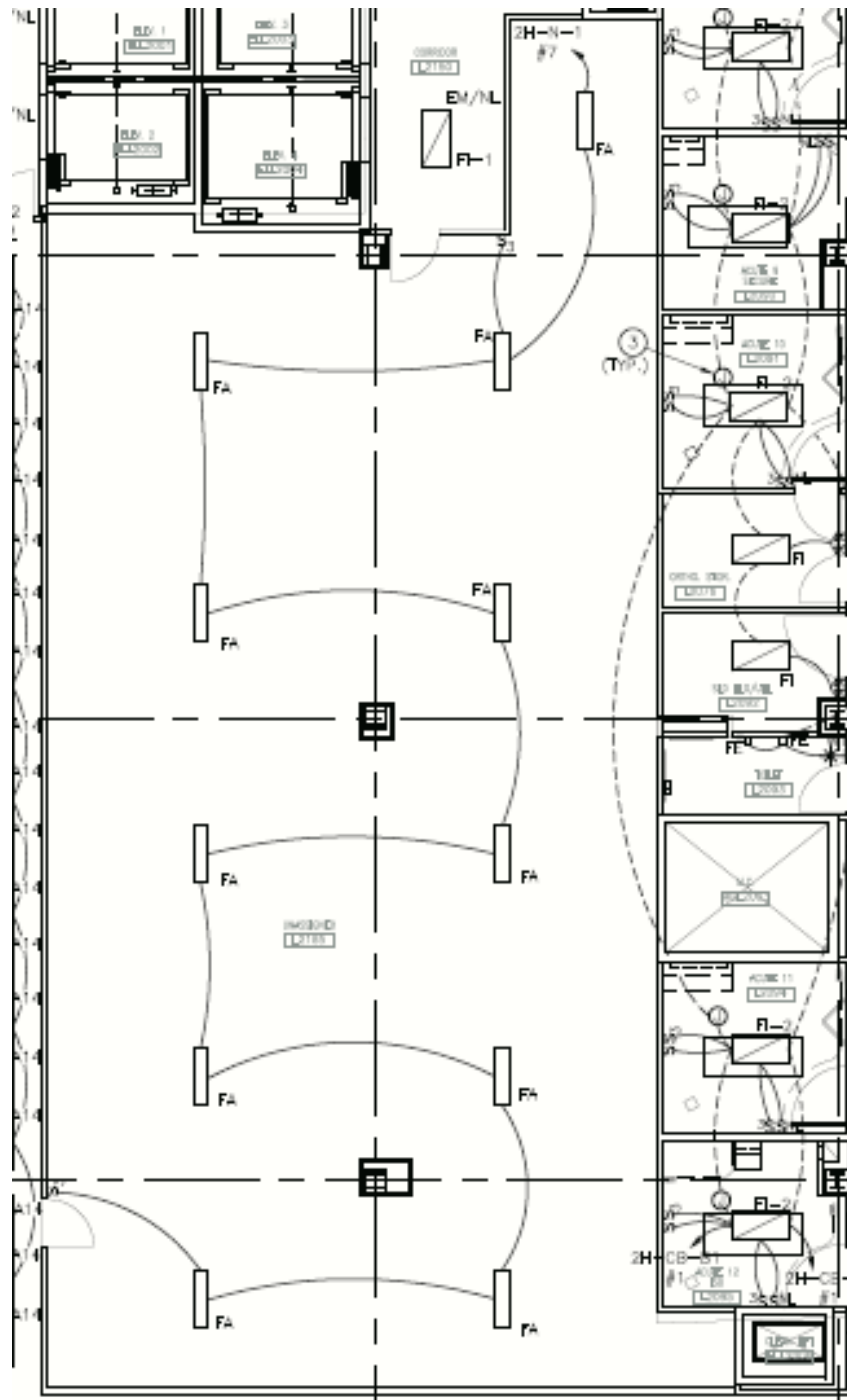
The image above is a pseudocolor image of the General Processing Area developed in AGI32.

Architectural Plan



The image above is a small section taken from architectural sheet A1.02-A of the Geisinger Critical Care Building plans. The full drawing is included electronically under file name 04136A1.02-A.pdf.

Lighting Plan



The image above is a small section taken from architectural sheet E1.05 of the Geisinger Critical Care Building plans. The full drawing is included electronically under file name 04136E1.05.pdf.

Space 1 (Large Work Space): General Processing Office

Design Criteria Outline:

A.) Appearance of Space and Luminaires

- a. The design in this space should incorporate simple, professional looking luminaires with high efficiency.
- b. The goal in the processing office is even lighting of surfaces and creation of a clean, professional-looking environment.

B.) Color Appearance

- a. Average CRI and CCT are acceptable criteria for lamp selection, but slightly cooler color temperature is preferable in order to match fluorescent lamping in other building spaces.

C.) Daylight integration and control

- a. This space is centrally located in the building and has no daylighting elements present.

D.) Direct Glare

- a. The most important direct glare issue in the space will be the incorporation of VDT terminals and computer processing in the general processing area.
- b. Luminaire selection should take low direct light angle into consideration.

E.) Flicker

- a. Flicker will not be an important design issue for this space.

F.) Distribution on Surfaces

- a. Light distribution in this space should be even over most surfaces in order to open up space; many spaces in the critical care building have no exterior walls, so the feeling of enclosure is a major psychological hurdle to overcome.
- b. Higher light levels on walls and directing light at the ceiling can help to make the space seem bigger.

G.) Light Distribution on Task Plane

- a. Task plane lighting is the most important lighting concern for the space and should be adequate for both paper-based and computer-based task completion.
- b. Medical records will be prepared in the space, so proper lighting is important for both reading and proper handling of, often complicated, documentation.

H.) Luminances of Room Surfaces

- a. Room surfaces are generally white (ceiling, walls) and will have high luminance and reflectance values.
- b. Floor covering is a relatively dark carpet, so floor contribution to light and luminance level will be less significant.

I.) Modeling of faces/objects

- a. Facial modeling is somewhat important in the space, but is not paramount in design consideration.
- b. General level of vertical illuminance should be fairly easy to achieve with high reflectance wall and ceiling finishes.

J.) Points of Interest

- a. Due to lack of windows and interest in space, artwork or other points of interest will be necessary in creating an interesting visual environment.
- b. Attractive, wall mounted luminaires can serve to create interest within the space, also.

K.) Reflected Glare

- a. Reflected glare will be a consideration in the space due to the high reflectance finish values.
- b. Even lighting of surfaces can reduce noticeable effects of reflected glare and attention to incident light angles will go far in controlling reflected glare in the space

L.) Shadows

- a. Shadowing is not generally recommended in the space due its geometry and location within the building.
- b. Shadowing on walls and ceilings can create a cave-like feeling, which is highly undesirable in this already enclosed space.

M.) Source/Task/Eye Geometry

- a. The most important geometry issue is concerned with direct glare on VDT screens as previously discussed in that section.

N.) Sparkle/ Desirable Reflected Highlights

- a. Sparkle directed at artwork can help break up long wall spans and make the space visually interesting.
- b. Also, as previously mentioned, attractive wall mounted luminaires that can be used for this reason as well should incorporate some level of sparkle and excitement.

O.) Surface Characteristics

- a. Walls and ceiling are highly reflective (white), matte finishes.
- b. Floor is generally dark, non-glossy absorptive carpet.

P.) System Control and Flexibility

- a. System control is likely to be simple; single or dual-level switching is likely applicable.
- b. An occupancy sensor to control power consumption during unoccupied stretches is a good consideration, however, since many spaces in the Critical Care Building will operate 24 hours, it is likely that this space will also be occupied most or all of the day.

Q.) Special Considerations

- a. Much of the lighting in this building is primarily functional, so drastic deviation from other space characteristics is not recommended; i.e. space could be made visually interesting, but should not look out of place among other, probably less interesting spaces.

Space 2 (Special Purpose): Operating room #1: Heart

Description: Operating room #1 is just one of many such spaces in the Critical Care Building. Though specifically designed and equipped for heart procedures, the space is typical of all operating rooms in that it is a state of the art, clean operating suite. It includes three separate booms (nurse equipment, anesthesia, equipment) to add permanent, flexible operating solutions in the room. The space is served by the clean supply lift via isolated sterile common areas amongst the operating suites.

Dimensions: Approximately 800 square feet; dimensions as shown

Existing Lighting Conditions:

Fixture Types (Number of Fixtures):

Type FF (16 luminaires)

Type FG-1 (2 luminaires)

Type FG (7 luminaires)

Type FG-2 (1 luminaire)

TYPE	DESCRIPTION	LAMPS	BALLAST(S)/VOLTAGE	DESIGN MAKE
FF	12" SQUARE OPERATING ROOM LIGHT: 2 LAMP EXTRUDED ALUMINUM RECESS MOUNTED LUMINAIRE CONSTRUCTED OF 20 GAUGE COLD ROLLED STEEL, ONE-PIECE, SEAM WELDED, WITH WHITE POWDER COAT FINISH, SILICONE SEALED. EQUIP WITH .125" THICK, PATTERN #12 PRISMATIC ACRYLIC LENS, INVERTED (SMOOTH SIDE DOWN). EQUIP WITH MAGNETIC BALLAST TO MINIMIZE RADIO AND HARMONIC INTERFERENCE AND EQUIP WITH RADIO FREQUENCY FILTER.	(2)26 WATT QUAD	(1)MAGNETIC LOW LEAKAGE WITH RADIO FREQUENCY FILTER 120/277 VAC	KENALL ESEF11212 SERIES, INFINITY PHSQ12, OR ACCEPTED EQUAL
FG	2'x4" RECESS MOUNTED DIRECTIONAL SURGICAL TROFFER: SIX LAMP, COMMERCIAL TYPE, RECESSED STATIC TROFFER LUMINAIRE WITH ONE PEICE KSH-34 HHS CLEAR ACRYLIC DIRECTIONAL LENS WITH RADIO SUPPRESSION GRID, MINIMUM .150" GAGE STEEL, NOMINALLY 2'x4' SIZE. PROVIDE FLUSH ALUMINUM DOOR FRAME WITH MTERED CORNERS, SPECIFICALLY DESIGNED TO OPERATE IN SPECIAL 1½" WIDE TEE-BAR GRID CEILING. PROVIDE URETHANE FOAM GASKET SEALS FULLY BETWEEN DOOR FRAME AND HOUSING TO ELIMINATE LIGHT LEAKS. USE MINIMUM 88% REFLECTANCE WHITE ENAMEL FINISH. UNIT SHALL BE SUITABLE FOR GRID CEILING CONSTRUCTION, BUT CONTRACTOR SHALL VERIFY. EQUIP WITH THREE 2-LAMP LOW LEAKAGE BALLASTS TO PERMIT MULTI-LEVEL SWITCHING. EQUIP WITH RIF SUPPRESSORS TO ELIMINATE ELECTRO-MAGNETIC INTERFERENCE. UL LISTED AND IN COMPLIANCE WITH MIL-STD 461E, 462 AND 463.	(6) F32T8	(3)MAGNETIC, 2-LAMP LOW LEAKAGE WITH RADIO FREQUENCY FILTER 120/277 VAC	HEALTHCARE LIGHTING INC. HST124 SERIES, VISTA 6924 SERIES, H.E. WILLIAMS MDS SERIES, OR ACCEPTED EQUAL BY ALKCO, KENALL.
FG-1	SAME AS TYPE FG, EXCEPT WITH EMERGENCY BATTERY PACK.	(6) F32T8	(3)MAGNETIC, 2-LAMP LOW LEAKAGE WITH RADIO FREQUENCY FILTER 120/277 VAC	HEALTHCARE LIGHTING INC. HST124 SERIES, VISTA 6924 SERIES, H.E. WILLIAMS MDS SERIES, OR ACCEPTED EQUAL BY ALKCO, KENALL, WITH BODINE GEN 3 SERIES BATTERY PACK.
FG-2	SAME AS TYPE FG, EXCEPT 2'x2'	(6) F17T8	(3)MAGNETIC, 2-LAMP LOW LEAKAGE WITH RADIO FREQUENCY FILTER 120/277 VAC	HEALTHCARE LIGHTING INC. HST124 SERIES, VISTA 6924 SERIES, OR ACCEPTED EQUAL BY ALKCO, KENALL.

Lighting Controls:

Lighting controls are typical, 2-pole switch type with the following note taken from electrical drawings sheet E1.13 (included electronically as file 04136E1.13.pdf):

Note I: Type FG luminaire has six (6) lamps with three (3) two (2) lamp ballasts. Wire such that the two (2) inner most lamps are controlled by switch with subscript “a”, the two (2) middle lamps are controlled by switch with subscript “b”, and the two (2) outer most lamps are controlled by the switch with subscript “c”.

Materials Summary:

Floor: **Welded Sheet Vinyl:** Altro Maxis Suprema – High performance safety flooring including 10” integral base; color – SU 2009 Minerva

- **Reflectance:** 0.25 (assumed)

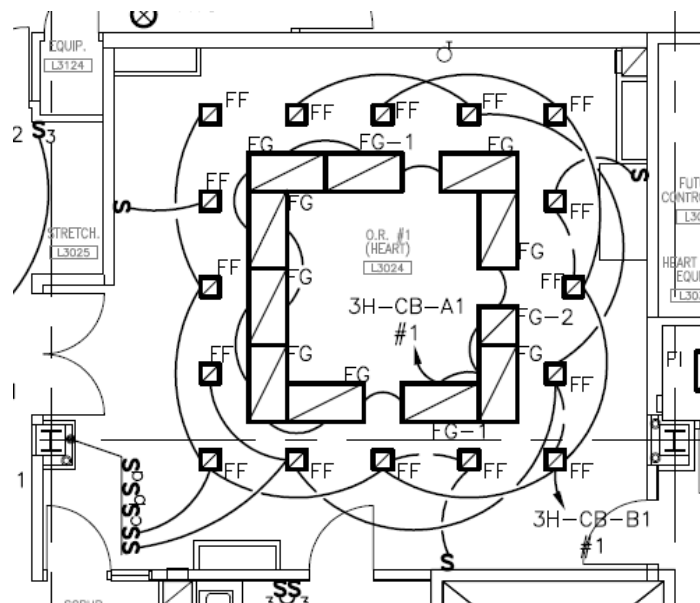
Walls: **Epoxy Paint:** Scuffmaster Scrubtough; color – 902MC (White)

- **Reflectance:** 0.72 (assumed)

Ceiling: **Gypsum:** unspecified material qualities; further investigation necessary

- **Reflectance:** 0.8 (assumed)

Lighting Plan



The image above is a small section taken from electrical sheet E1.13 of the Geisinger Critical Care Building plans. The full drawing is included electronically under file name 04136E1.13.pdf.

Spatial Analysis:

AGI32 analysis of this space yielded the following illuminance values for the Operating Room:

AGI 32 Analysis of Operating Room #1: Heart					
	Reflectance	Average Illuminance (fc)	Maximum (fc)	Minimum (fc)	Max/Min
Ceiling	0.8	57.46	88.8	31.7	2.8
Walls	0.72	83.93	154	37.5	4.1
Floor	0.25	193.57	343	36.7	9.35
Workplane	n/a	216.3	448	57.9	7.73

Light loss factor for the values in the table above were determined as follows:

$$[LLF = BF \times LLD \times LDD \times RSDD]$$

Ballast Factor (BF) = 0.95 for fluorescent luminaires

Lamp Lumen Depreciation (LLD) = 0.82 for high-output fluorescent lamp

Luminaire Dirt Depreciation (LDD) = 0.96 for Category V, very clean, 6 month cycle

Room Surface Dirt Depreciation = 0.98

- for RCR = 2.0; cavity height = 6', room width = 32', room length = 28'
- for percent expected dirt depreciation (%EDD) = 5%; very clean @ 6 months
- for luminaire distribution type direct

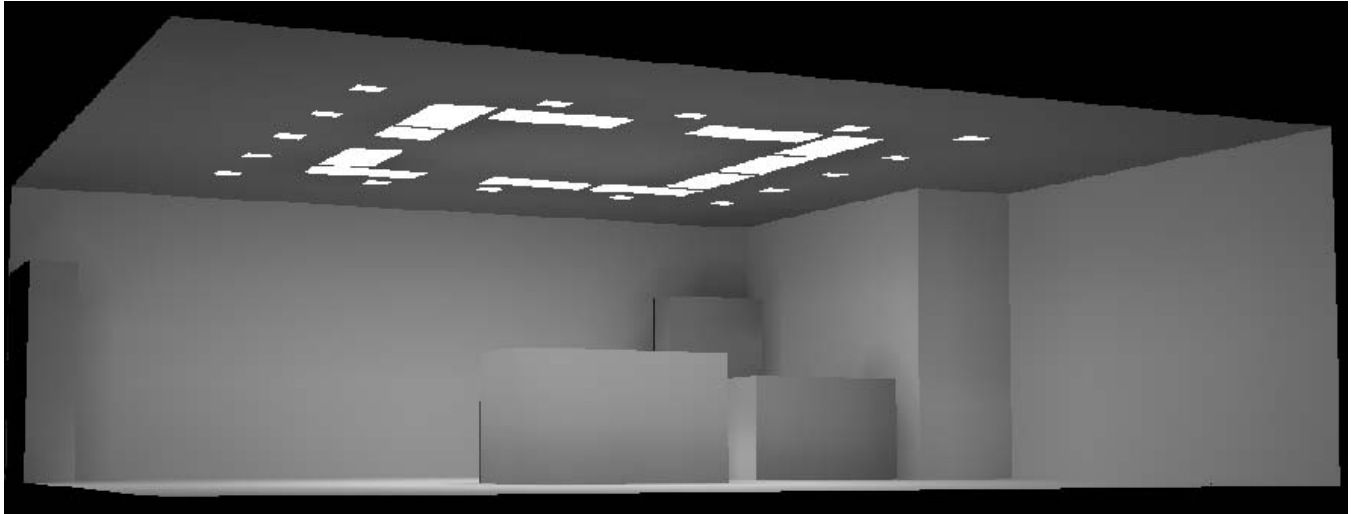
$$LLF = 0.95 \times 0.82 \times 0.96 \times 0.98$$

$$LLF = 0.7328$$

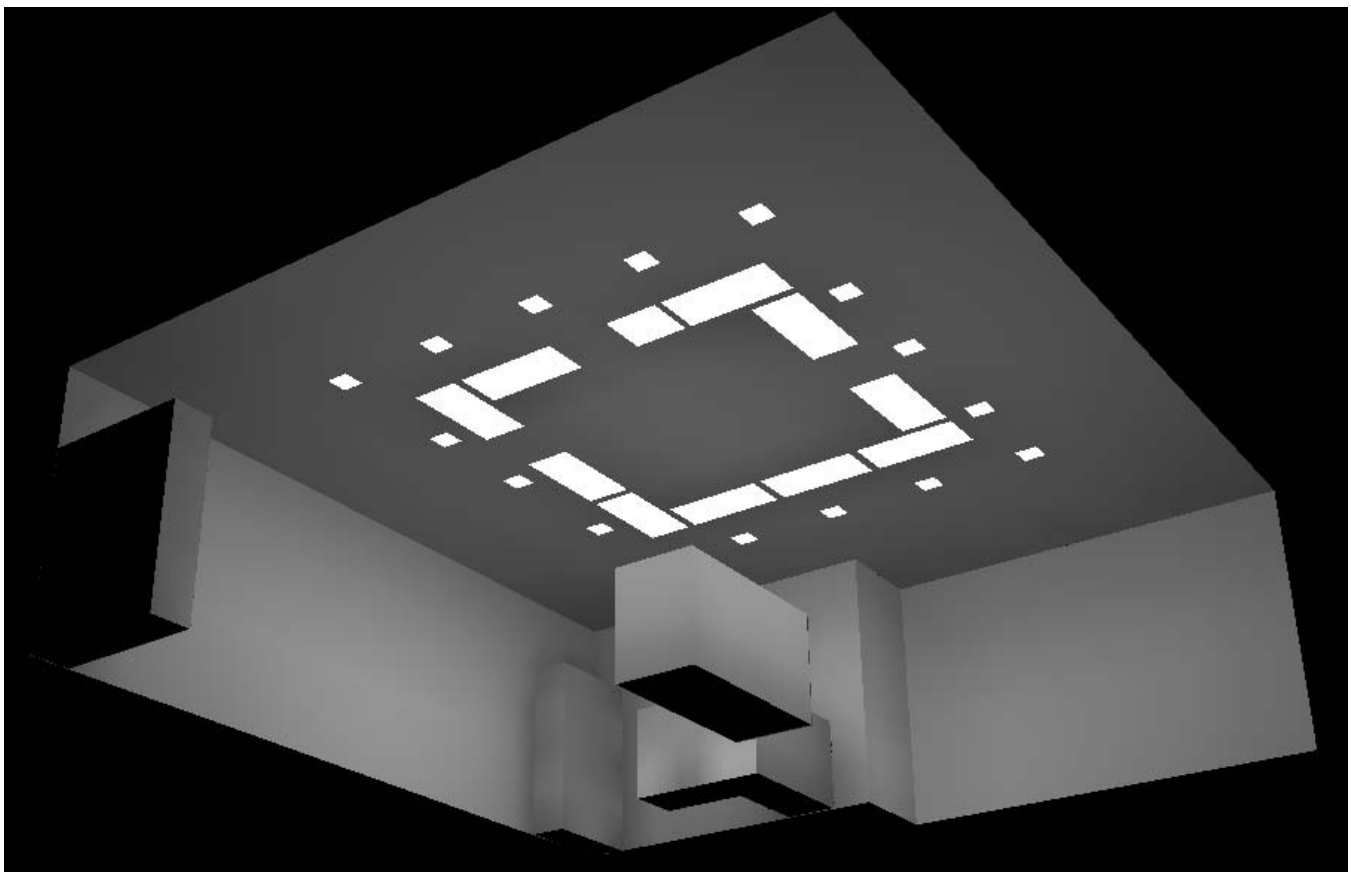
The above values are within range of expected average illuminance values for a space of this type. IESNA lists recommended illuminance of 300 footcandles on the workplane, which is higher than the output values of the AGI calculation. However, I will still consider the design in the operating appropriate for the following reason. The workplane calculation shown above is a general workplane value for the entire space, not the operating table itself. The values of illuminance along the operating table are, in fact, much higher than the 216.3 fc average for the entire workplane (the maximum value of 448 fc occurs on the operating table). Other average values are much higher than necessary for the space, but it should be taken into account that operating conditions for the space are not always at these high levels of illuminance.

The luminaires in the space are switched for multiple level lighting, which helps keep the operating room in line with power density codes. Generally, many of the fixtures will not be operating at full capacity and these values will be much lower, but it is important to know that high values of illuminance are available.

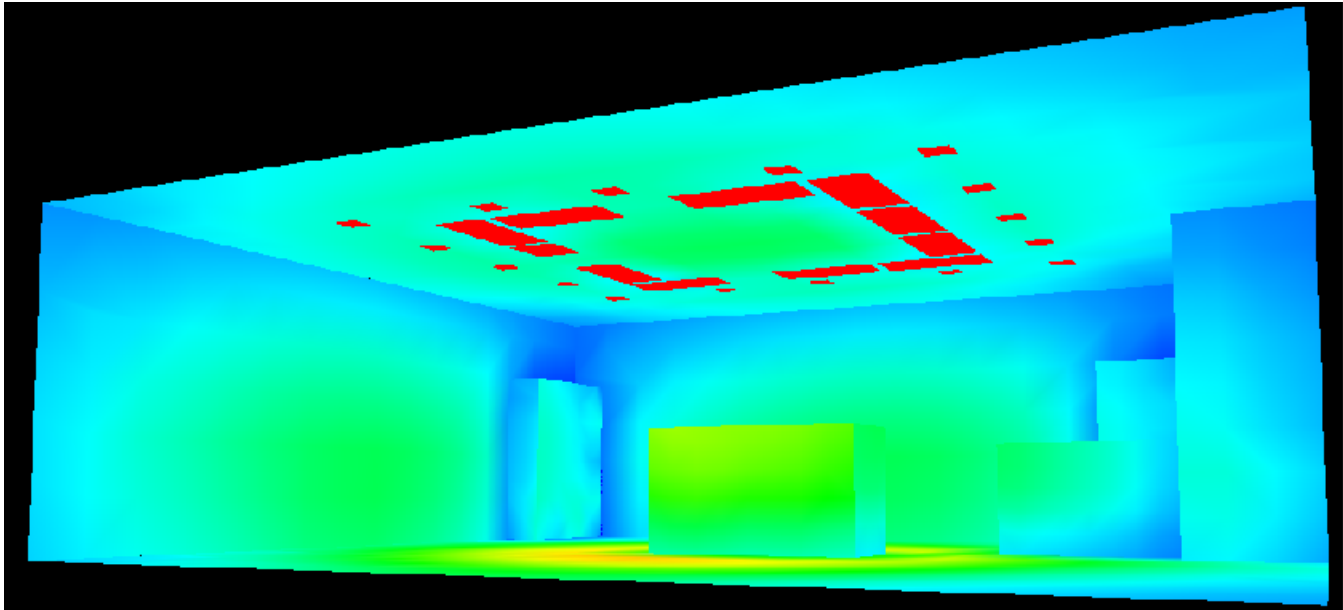
Pictured on the following pages are several images including AGI32 renderings, plans and elevations of Operating Room #1: Heart.



The image above is a radiosity image of the General Processing Area developed in AGI32.

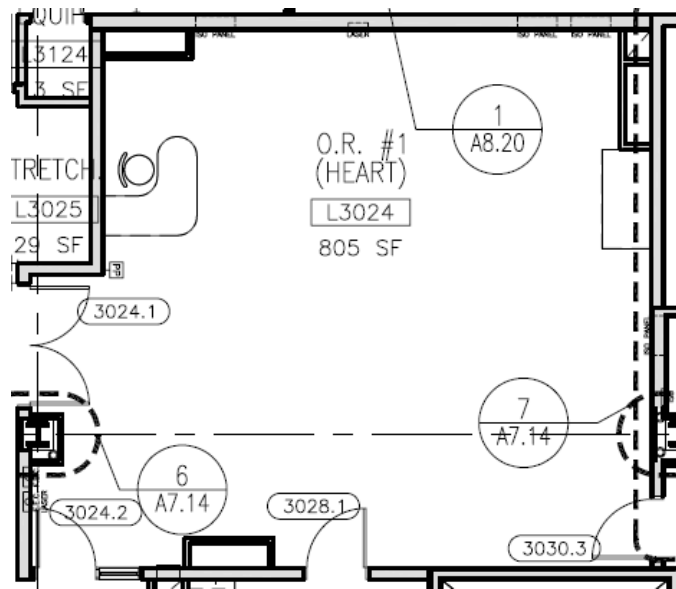


The image above is a radiosity image of the General Processing Area developed in AGI32.



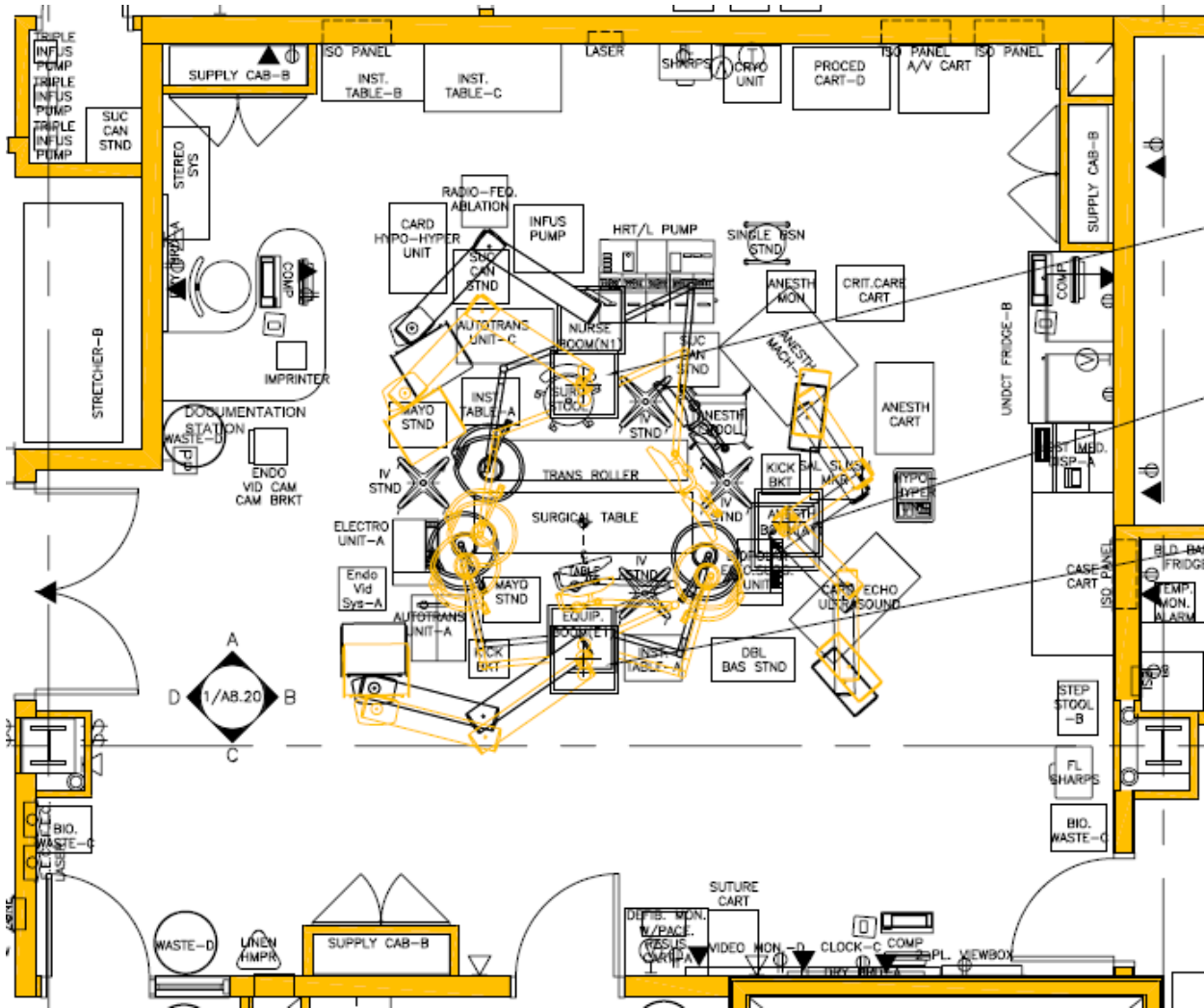
The image above is a pseudocolor image of the General Processing Area developed in AGI32.

Architectural Plan



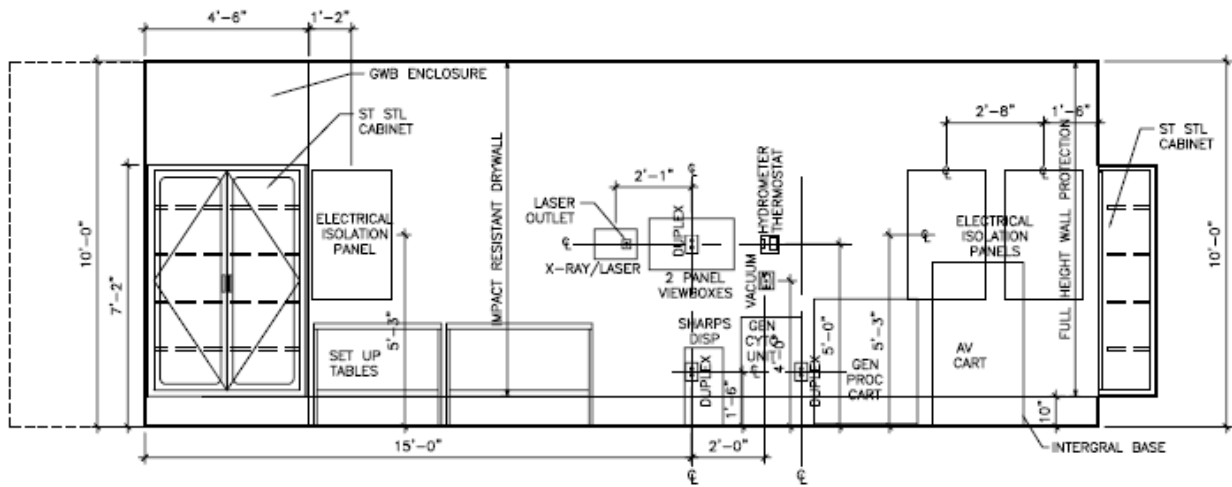
The image above is a small section taken from architectural sheet A1.03-A of the Geisinger Critical Care Building plans. The full drawing is included electronically under file name 04136A1.03-A.pdf.

Equipment Plan

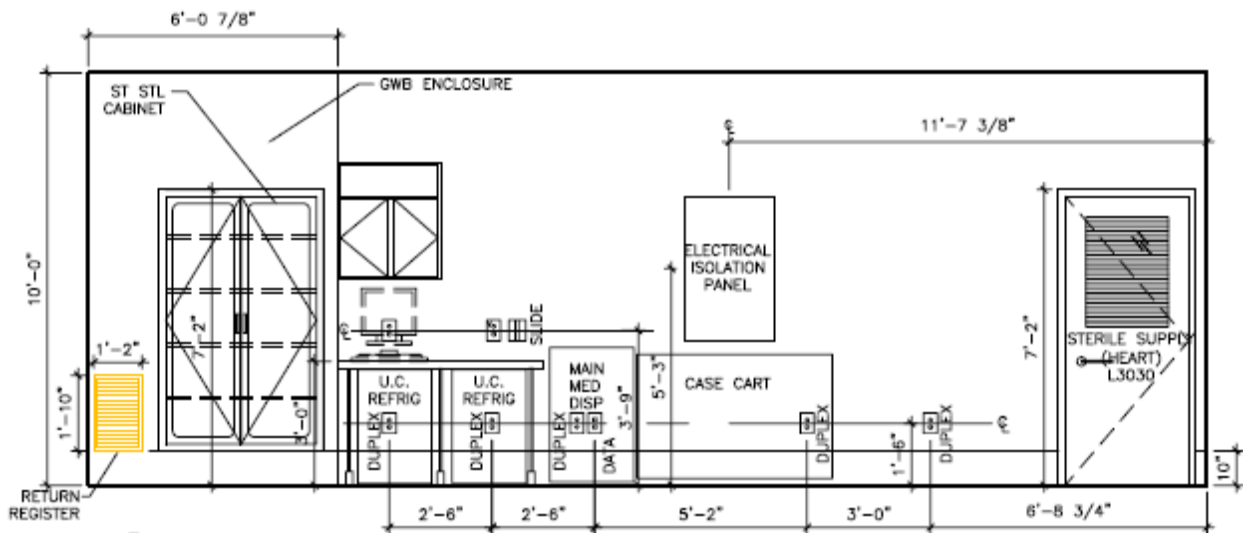


The image above is a small section taken from architectural sheet A8.20 of the Geisinger Critical Care Building plans. The full drawing is included electronically under file name 04136A8.20.pdf.

Elevations

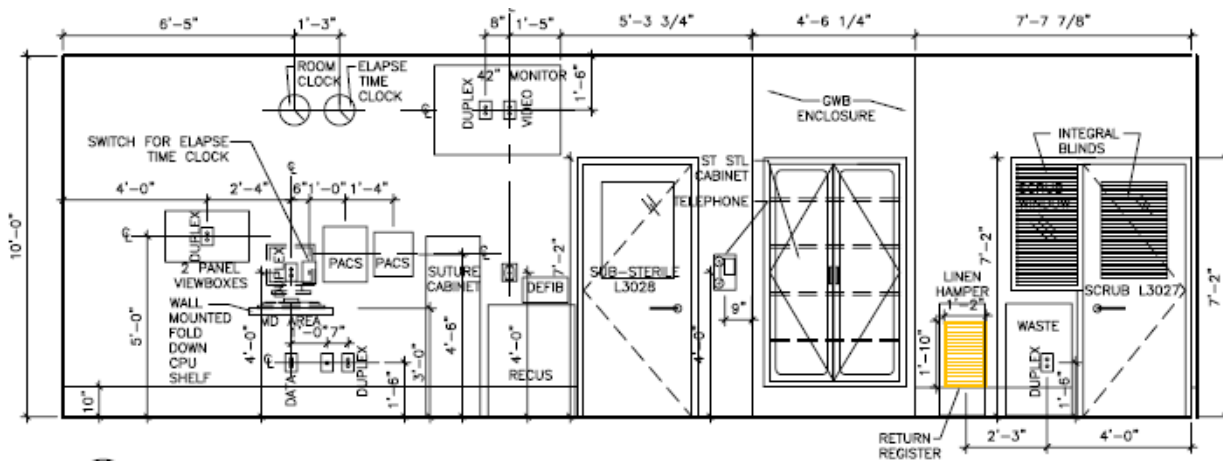


The image above is a small section taken from architectural sheet A8.20 of the Geisinger Critical Care Building plans. The full drawing is included electronically under file name 04136A8.20.pdf.

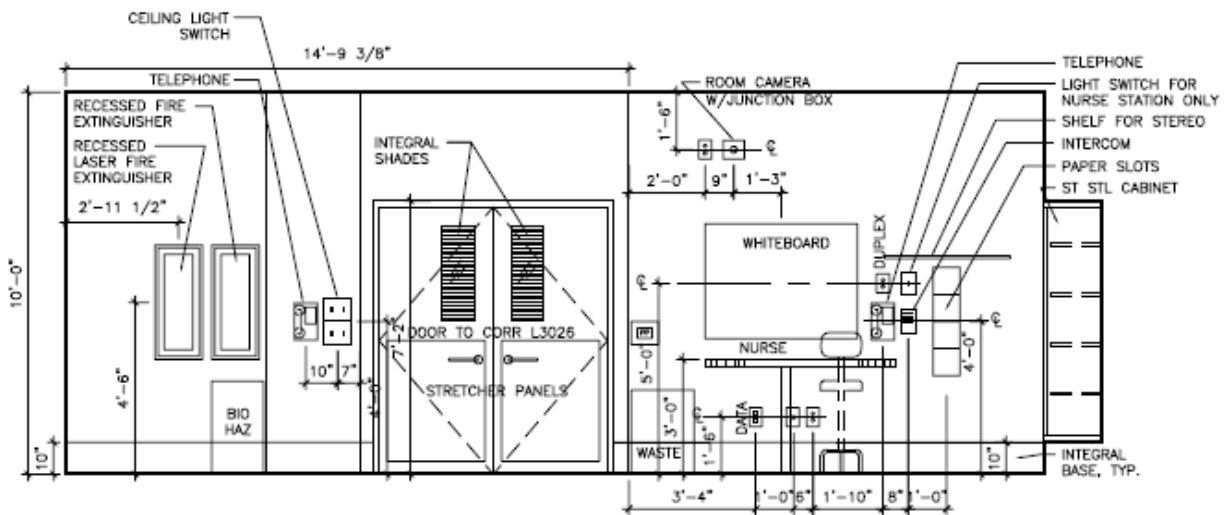


The image above is a small section taken from architectural sheet A8.20 of the Geisinger Critical Care Building plans. The full drawing is included electronically under file name 04136A8.20.pdf.

Elevations (cont.)



The image above is a small section taken from architectural sheet A8.20 of the Geisinger Critical Care Building plans. The full drawing is included electronically under file name 04136A8.20.pdf.



The image above is a small section taken from architectural sheet A8.20 of the Geisinger Critical Care Building plans. The full drawing is included electronically under file name 04136A8.20.pdf.

Space 2 (Special Purpose): Operating room #1: Heart

Design Criteria Outline:

A.) Appearance of Space and Luminaires

- a. The appearance of light in the space is only somewhat important compared to the functionality of the lighting solution due to the highly complex procedures that take place in this space.
- b. Some consideration should be given to illuminance levels outside the operating table area to keep lighting contrast levels adequate; this will lead, most likely, to very high ambient light levels throughout the space.

B.) Color Appearance

- a. Color rendering is important, again, due to the complexity of surgical procedures.
- b. As for overall color temperature, the space will primarily be clinical, so CCT is not a mitigating factor in the design of the lighting system; CRI should take precedence over CCT.

C.) Daylight integration and control

- a. This space is centrally located in the building and has no daylighting elements present.

D.) Direct Glare

- a. Direct glare from luminaires in the space should be avoided as much as possible, but does not play a major role in the design of the lighting system for the space.
- b. Most often, directional troffers are implemented in order to direct light towards the operating table, which cuts down on glare within the space.

E.) Flicker

- a. Flicker can be an important consideration given the high level of technology present in the space.
- b. Consideration should be given to rapidly rotating or moving parts of operating equipment.
- c. Frequency of flicker of fluorescent lamps may affect visibility of any VDT screens (computer, camera, etc.), so these parameters should be examined prior to luminaire selection.

F.) Distribution on Surfaces

- a. Light distribution is most important on the workplane level (operating table) and this distribution should take utmost importance in the space.
- b. Wall and ceiling illuminance are less important to task performance, but even lighting of these surfaces is important to creating a comfortable working space.
- c. Casework, countertops, equipment stacks and other essential equipment is located along the walls of the operating room, so vertical illuminance levels should be high enough for adequate operation of these elements.

G.) Light Distribution on Task Plane

- a. This element takes extreme importance as evidenced by movable task lighting incorporated in surgical stacks and equipment boom arms.
- b. The intense complexity of procedures in the space demands high quality, high level ambient lighting, supplemented by movable task lighting in the vicinity of the operating table.

H.) Luminances of Room Surfaces

- a. Room surface luminances play a minor role in design considerations for the space.
- b. Illuminance levels are much more important than luminances because accents, sparkle and other visually pleasing aspects of lighting are not particularly important in the space.

I.) Modeling of faces/objects

- a. Object modeling is important up to the point of equipment implementation and recognition; modeling of faces and objects for considerations outside effectiveness of work is not a consideration in the operating space.

J.) Points of Interest

- a. Points of interest are primarily limited to, as mentioned previously, operating table and associated equipment.
- b. Accent lighting and other such methods of lighting points of interest are not important and/or appropriate considerations for the space.

K.) Reflected Glare

- a. Reflected glare will be a minor consideration in the space due to small room geometry and specialized lighting considerations.

L.) Shadows

- a. Shadows of any kind are undesirable in the space due to its functional nature.
- b. Use of shadow for attractiveness is not a smart design goal because the space is not designed to be visually interesting to the extent it is to be visually efficient.

M.) Source/Task/Eye Geometry

- a. Lighting in this relatively small working space will be primarily downlight and flexible, directional task lighting, so source/task/eye geometry should not become a critical issue.
- b. Obviously, problems encountered along these lines should be taken care of immediately, but no significant issues are expected.

N.) Sparkle/ Desirable Reflected Highlights

- a. Reflected highlights are not important in the space.

O.) Surface Characteristics

- a. Surfaces in the space are generally high reflectance, matte finishes such as white epoxy paint and light colored, non-slip flooring.
- b. Even distribution of light across these surfaces is desirable to create the crisp, clean work environment needed in clinical spaces.

P.) System Control and Flexibility

- a. Flexibility of this lighting system is as important consideration due to power density complications that can arise within such a specialized space; the extremely high lighting levels necessary when performing a procedure is almost never desirable in the space when no procedure is taking place.
- b. Highly complicated controls are not necessary per se, but multi-level switching or zonal flexibility should be implemented for lower complexity tasks that will be performed in the space (i.e. cleaning, equipment maintenance, etc.)

Q.) Special Considerations

- a. Due to risk of possible infection and/or contamination, only clean room rated luminaires are acceptable selections for the operating room.
- b. Directional troffers, movable task lighting and other methods will need to be considered in order to provide the best possible work environment.

Space 3 (Circulation Space): Main Waiting Room/Corridor

Description: The main waiting room of the Critical Care Building is connected via the main entry corridor to the triage area and, subsequently, to the rest of the building. Entrance vestibules serve the space at two separate locations. The primary purpose of the space is as an information/ inpatient registry as well as providing a comfortable space for family and friends of patients to convene.

Dimensions: Approximately 2,750 square feet; dimensions as shown

Existing Lighting Conditions:

Fixture Types (Number of Fixtures):

Type A13 (4 luminaires)

Type A17 (11 luminaires)

Type A14 (8 luminaires)

Type FE (4 luminaires)

Type A15 (11 luminaires)

TYPE	DESCRIPTION	LAMPS	BALLAST(S)/VOLTAGE	DESIGN MAKE
A13	RECESSED LINEAR FLUORESCENT TROFFER LUMINAIRE DESIGNED FOR USE IN ARMSTRONG TECHZONE CEILING WITH SQUARE LAY IN TILE, NOMINAL 48" LONG x 6" WIDE x 4½" RECESS DEPTH, CLEAR ACRYLIC LINEAR PRISMATIC LENS, MULTI-VOLT HPF ELECTRONIC BALLAST.	(2)F28T5/835/ALTO	(1) ELECTRONIC, HPF, <10% THD 120/277VAC	LITHONIA LIGHTING, TZ 5 120/277 VOLT SERIES
A14	RECESSED LINEAR FLUORESCENT WALLWASHER, NOMINAL 4' LONG x 3" WIDE x 4" MAXIMUM RECESS DEPTH EXTRUDED ALUMINUM HOUSING, SPECULAR ALUMINUM ASYMMETRIC REFLECTOR, PAINT FINISH OF CEILING TRIM TO BE SELECTED BY ARCHITECT, HIGH POWER FACTOR ELECTRONIC BALLAST.	(2)F28T5/835/ALTO	(1) ELECTRONIC, HPF, <10% THD 120/277VAC	SE'LUX, M1W2-1T5-SH-004-(FINISH)-(120/277)SERIES PEERLESS, FOCAL POINT
A15	RECESSED COMPACT FLUORESCENT DIRECT/INDIRECT 2' x 2' TROFFER LUMINAIRE WITH DOME REFLECTOR AND PERFORATED METAL LAMP SHIELD, NOMINAL 5½" DEEP HOUSING WITH LAY IN CEILING MOUNTS, HIGH POWER FACTOR MULTI-WATT ELECTRONIC BALLAST WITH LAMP FAILURE PROTECTION CIRCUIT.	(1)PL-L50W/835 /835/RS/IS	(1) ELECTRONIC, HPF, <10% THD 120/277VAC	LIGHTOLIER LIGHTING QVC-2-G-PF-0S-1-FT-(120/277)-BR
A17	RECESSED COMPACT FLUORESCENT OPEN DOWNLIGHT WITH HORIZONTAL LAMPING, NOMINAL 6" SQUARE APERTURE, MAXIMUM 6½" DEEP HOUSING, SEMI-SPECULAR CLEAR ANODIZED REFLECTOR CONE AND RETURN FLANGE, HIGH POWER FACTOR MULTI-WATT ELECTRONIC BALLAST WITH LAMP FAILURE PROTECTION CIRCUIT.	(1)PL-T26W/835 /4P/ALTO	(1) ELECTRONIC, HPF, <10% THD 120/277VAC	KURT VERSEN H8643/26W/120/227/LP SERIES
FE	6"x48" RECESS WALL MOUNTED TROFFER, ADA COMPLIANT WITH EXTRUDED ALUMINUM FRAME WITH SOLID METAL TRIM AND ACCENTS, TO BE SELECTED BY THE ARCHITECT AT THE TIME OF SUBMITTALS. EQUIP WITH .125" THICK VIRGIN ACRYLIC DIFFUSER WITH MATTE FINISH. UNIT SHALL HAVE SHALLOW 3½" DEEP RECESSED HOUSING, UL LISTED.	(1)FP28/835	(1)ELECTRONIC, HPF, 120/277 VAC	MAKE: VISA LIGHTING "VISAGE" CB6658 SERIES, OR ACCEPTED EQUAL.

Lighting Controls:

Lighting controls are typical, 2-pole switch type.

Materials Summary:

- Floor:* Carpet tile: Lee's Modular DN073 textured blocks; color – 411 Alpine Valley
- **Reflectance:** 0.18 (assumed)
- Walls:* Ceramic paint: MDC general wall/ soffit paint; color – 902MC (white)
- **Reflectance:** 0.72 (assumed)
- Ceiling:* Acoustical Ceiling Tile: Armstrong Dune square lay-in; color – white; number – 1851; size – 24"x 48"; grid – prelude 15/16" exposed tee grid, white
- **Reflectance:** 0.8 (assumed)

Spatial Analysis:

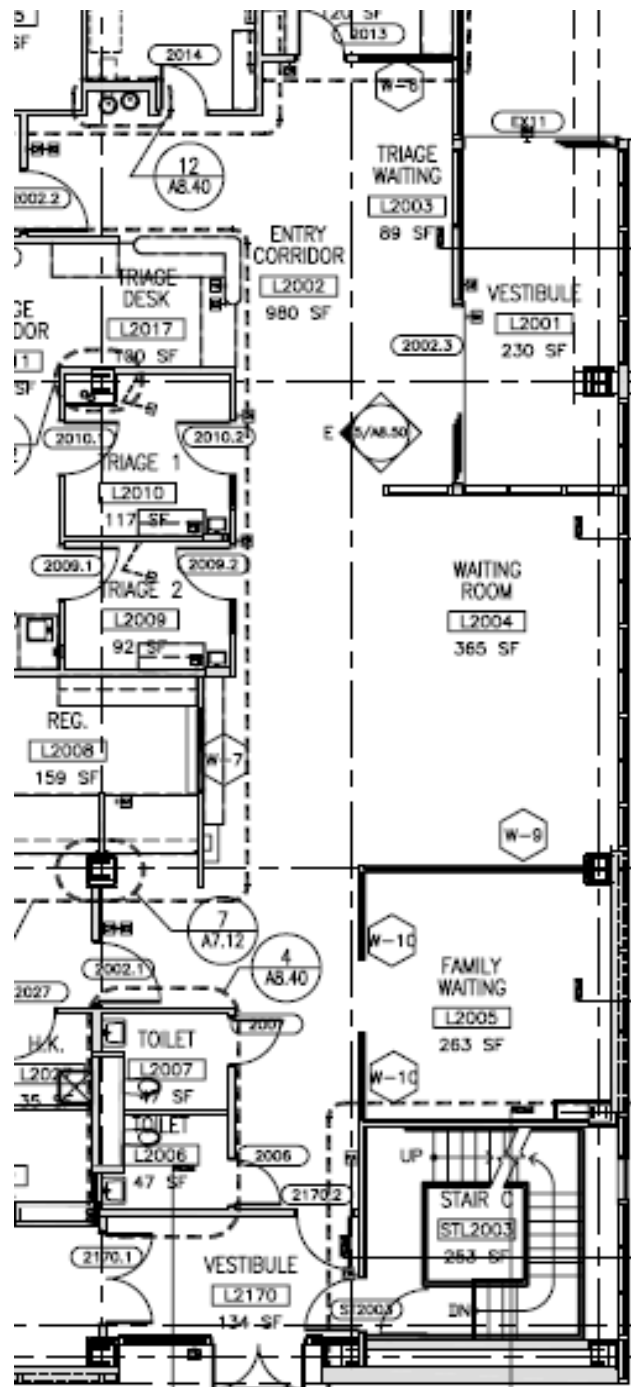
The lighting system in this space is well conceived and should serve the space well. The large bay of windows on one side is offset by a row of fluorescent fixtures that will brighten up the wall opposite the windows, striking a comfortable balance of brightness within the space. Selection and spacing of fixtures is appropriate for the environment, but may be based on a 'too-functional' set of criteria.

Some changes could be made in order to make the space a little more habitable and more exciting. For example, the row of wall washing luminaires are ceiling mounted, which is desirable functionally, but not very interesting within the space. By switching from wall washing fixtures to wall sconces the designer could play a little with light and shadow and create an interesting visual environment within the space. Also, it seems a primarily functional decision to choose lamps that match those for other luminaires and spaces in the building because it would serve a socially driven space to specify lamping with warmer color temperature. The warmer light can have a calming effect within the space which is an important issue considering the use of the waiting area as an emergency and/or surgery patient visitor space.

In addition, no mention was made for specific task lighting issues for the reception and triage desks located in the waiting area. The plan basically incorporates a single design for both a social area and task area, which probably makes compromises on both fronts. This issue is discussed in detail in the design criteria outline to follow.

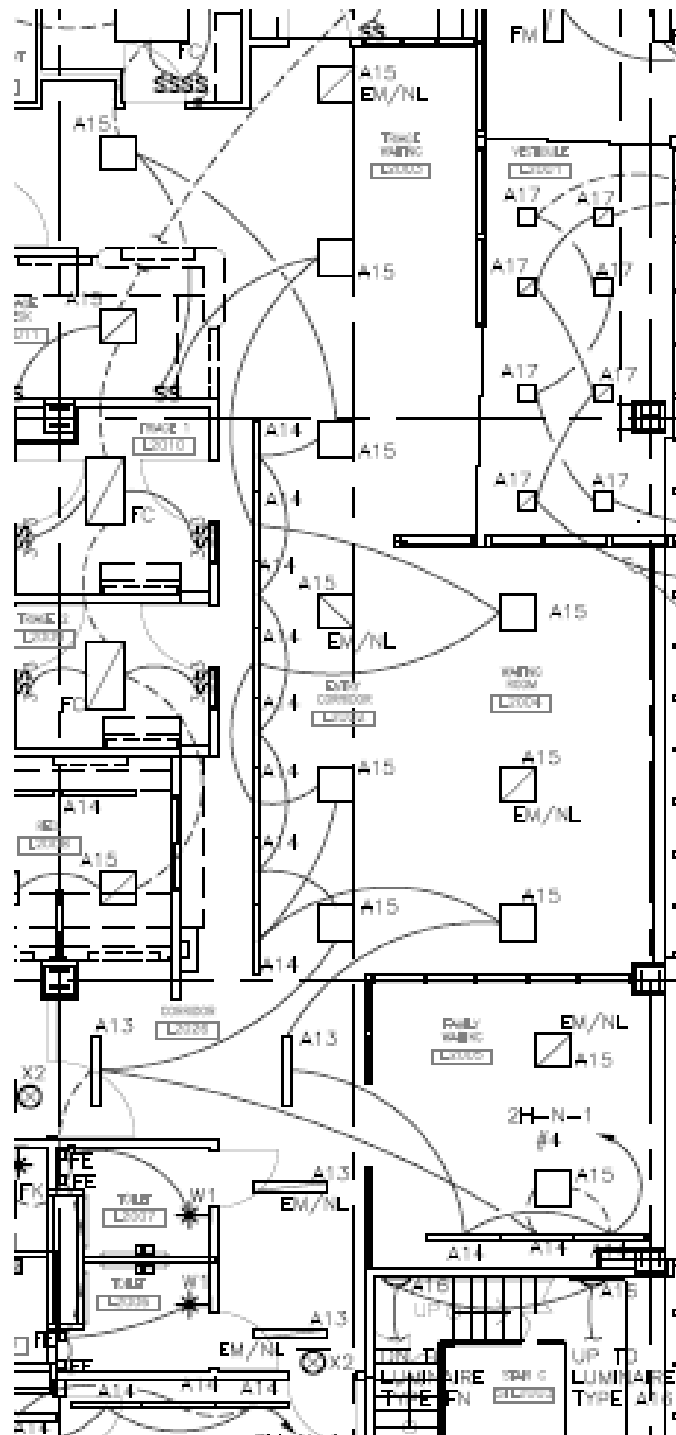
Architectural and lighting plans, as well as space elevations are included on subsequent pages.

Architectural Plan



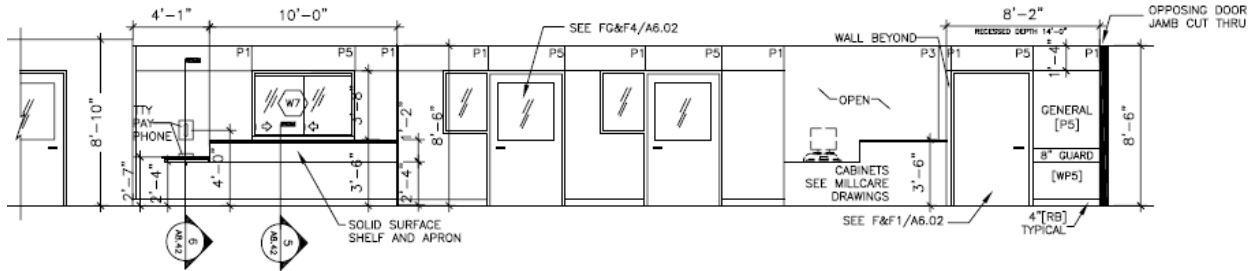
The image above is a small section taken from architectural sheet E1.05 of the Geisinger Critical Care Building plans. The full drawing is included electronically under file name 04136E1.05.pdf.

Lighting Plan

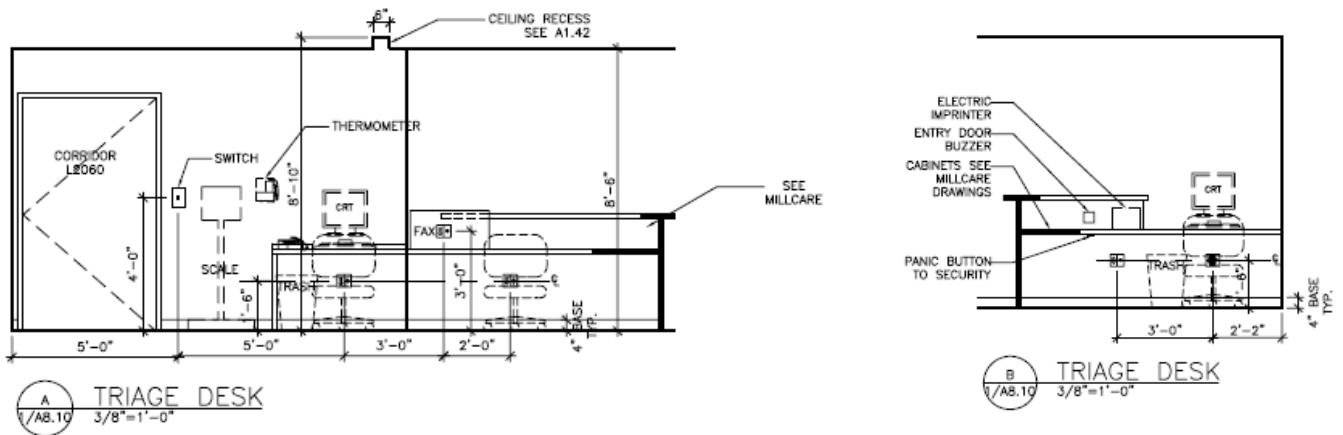


The image above is a small section taken from electrical sheet E1.05 of the Geisinger Critical Care Building plans. The full drawing is included electronically under file name 04136E1.05.pdf.

Elevations

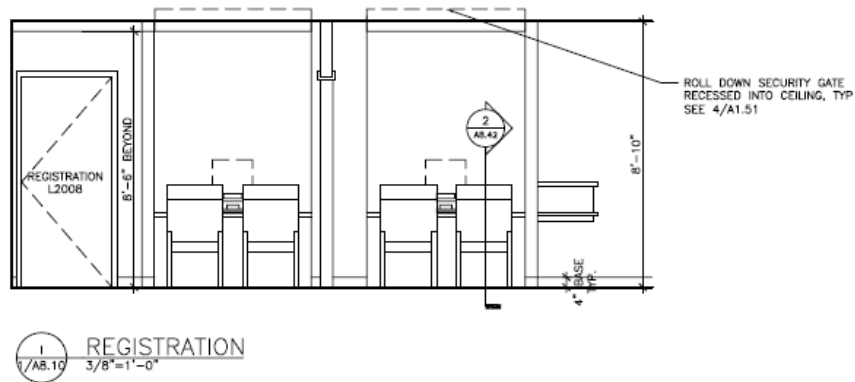
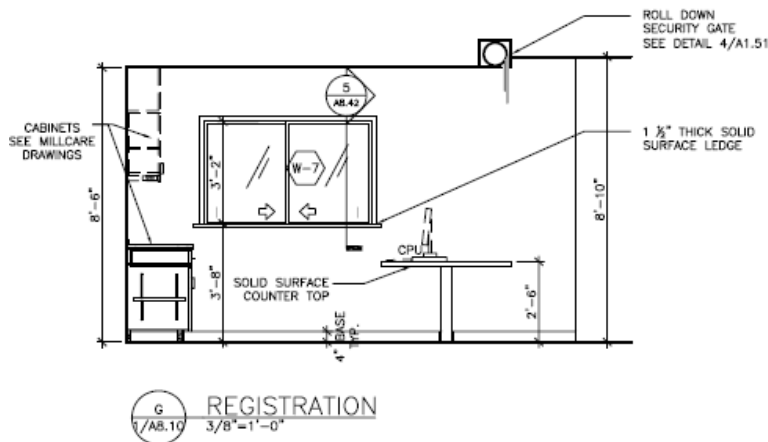
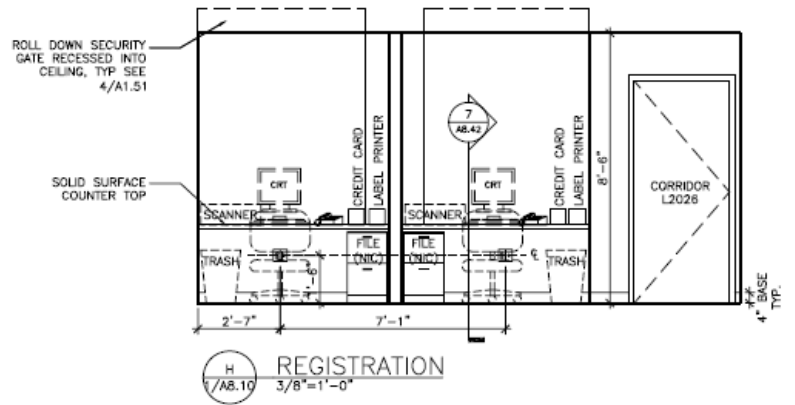
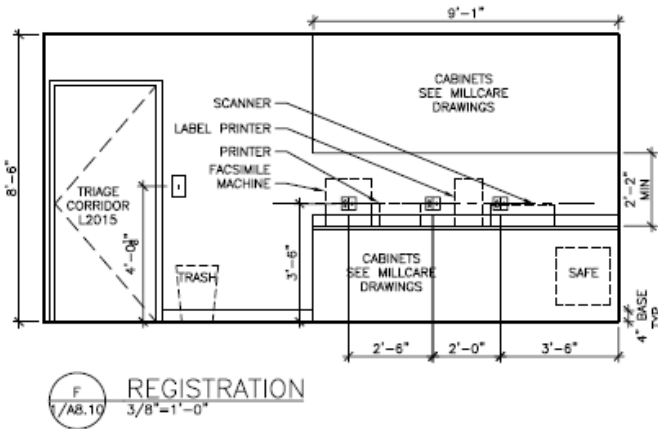


The image above is a small section taken from architectural sheet A8.50 of the Geisinger Critical Care Building plans. The full drawing is included electronically under file name 04136A8.50.pdf.



The images above are small sections taken from architectural sheet A8.10 of the Geisinger Critical Care Building plans. The full drawing is included electronically under file name 04136A8.10.pdf.

Elevations (cont.)



The images above are small sections taken from architectural sheet A8.10 of the Geisinger Critical Care Building plans. The full drawing is included electronically under file name 04136A8.10.pdf.

Space 3 (Circulation Space): Main Waiting Area/Corridor

Design Criteria Outline:

A.) Appearance of Space and Luminaires

- a.) The appearance of the waiting room should be warm and relaxing with an emphasis placed on creating a space that is both visually and physically comfortable.
- b.) Fixtures should be attractive as this is the primary space for visitors in the building and because of the possibility of individuals spending long, continuous spans of time within the space.
- c.) It may be a good idea to brighten the walls of the space to reduce the feeling of enclosure within the waiting room.

B.) Color Appearance

- a.) Color appearance is important for both color rendering and comfort of the space; warm white fluorescent or incandescent lamps can help create a comfortable atmosphere that is appropriate for spending large amounts of time within the space.
- b.) There will be artwork used to make the space visually interesting, so good CRI is desirable.

C.) Daylight Integration and Control

- a.) There is a large span of windows along the exterior wall of the main waiting room, so daylight control will be an important factor in design development.
- b.) Daylight will still be a secondary source within the space, in order to more closely control the visual environment within the space; window shading or glazing is a likely control measure.

D.) Direct Glare

- a.) Direct glare will not be a primary concern due to the limited nature of tasks to be performed within the space.
- b.) Again, window shading or glazing will be an important measure for reducing the overall amount of glare within the waiting area.

E.) Flicker

- a.) Flicker will not be a design consideration within the space.

F.) Light Distribution on Surfaces

- a.) Brightness of the walls and ceiling of the space will be important in creating the impression of a more open and accessible space.
- b.) Proper illumination of corridors and walkway areas is important for safety considerations.

G.) Light Distribution on Task Plane

- a.) Workplane illuminance should be adequate for recreational reading in the main waiting area.
- b.) Areas which will require a slightly greater amount of task plane light are the reception and triage desks, where supplementary task lighting or additional luminaires should be considered.

H.) Luminances of Room Surfaces

- a.) Room surface luminance is important to the point where brightness of the walls and ceiling can provide an open feel throughout the waiting area.
- b.) Spacing and type of luminaire can interact with surface luminance in order to create attractive shadowing and points of interest.

I.) Modeling of Faces/Objects

- a.) Modeling of faces and objects in the space is important due to its primarily social use and the amount of personal contact that is likely to occur within the space.

- b.) This consideration should take into account both vertical illuminance within the space as well as correlated color temperatures and color rendering indexes appropriate for attractive modeling of individuals.

J.) Points of Interest

- a.) The two functional points of interest in the space are the reception and triage desks. Additional lighting of these spaces is ideal both for recognition of importance and for task performance within these areas.
- b.) Accent lighting of artwork within the space will be considered and integrated into overall design solution.
- c.) Consideration of interesting luminaire layouts can guide waiting room floor plan configuration and can create an interesting atmosphere in its own right (i.e. typical open waiting space vs. several small waiting clusters)

K.) Reflected Glare

- a.) Though not of primary concern, due to high surface reflectances, glare may become an issue within the space.
- b.) Consideration of reflectance off windows is the most important design consideration regarding reflected glare.

L.) Shadows

- a.) Shadowing will be an important consideration in creating a comfortable lighting environment.
- b.) Careful consideration of shadow placement with brightness of walls can drastically change atmosphere within the space so, design will have to incorporate accurate shadow placement description.

M.) Source/Task/Eye Geometry

- a.) This geometry should not be of critical importance within the space.
- b.) However, attention should be paid to direct glare upon computer screens within the desk areas.

N.) Sparkle/ Desirable Reflected Highlights

- a.) Sparkle is appropriate in accent lighting of artwork and other points of interest.
- b.) Wall sconces and other lighting accents are desirable to increase attractiveness of visual environment
- c.) Luminaires selected for general ambient lighting conditions, however, need not be concerned with amount of sparkle they incorporate.

O.) Surface Characteristics

- a.) Surface characteristics within the space are generally high reflectance/ low gloss.

P.) System Control and Flexibility

- a.) System control in the space is generally straightforward due to 24 hour use of space.
- b.) Daytime and nighttime lighting conditions are the only two considerations really necessary for the space.

Q.) Special Considerations

- a.) It may be appropriate to adjust minimum light levels slightly higher than recommended due to high frequency of elderly visitors.

Space 4 (Outdoor Space): Parking and Patient Drop-off

Description: The parking/ patient drop-off area is located just outside the building, adjacent to the main waiting area vestibules on two sides of the building. Two entrances provide access to handicapped parking and patient drop-off for the building. The area mainly provides temporary parking for visitors, while the (existing) primary parking area is located across the street from the Critical Care Building addition. Pavement, markings and landscaping are to match current Geisinger Wyoming Valley campus conditions.

Dimensions: Approximately 40,000 square feet

Existing Lighting Conditions:

Fixture Types (Number of Fixtures):

Description: Outdoor lighting is provided by six (6) pole-mounted, low profile metal halide luminaires. Fixtures are nominally 19” wide, 19” long and 12” high, constructed of diecast aluminum with silver metallic finish. All fixtures are provided with type 3 refractor and are gasketed and weather resistant. Poles for fixtures are 20’-0” in height.

Lamps: One (1) 2500W metal halide

Ballast(s)/ Voltage: (1) Multi-tap, HPF 277VAC with single fuse

Make: Visionaire Lighting, American Series

Lighting Controls:

The exterior lighting is controlled on a separate circuit by a timer. The timer is set to conform with existing GWV campus exterior lighting.

Materials Summary:

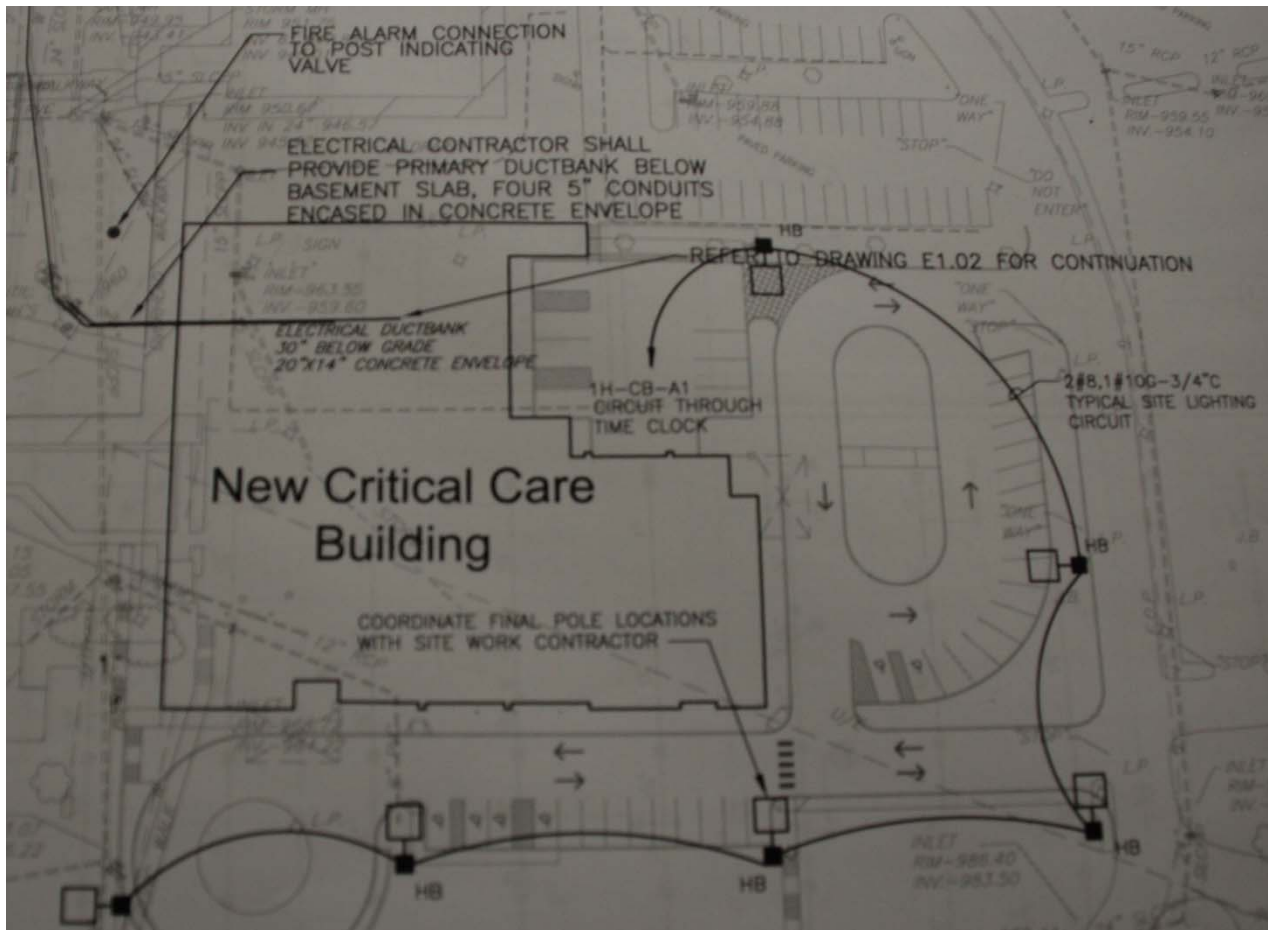
Outdoor materials are typical to Geisinger Wyoming Valley campus and include concrete, asphalt and ground cover with small foliage. Building façade is a combination of masonry and glass, also to match GWV campus existing conditions.

Spatial Analysis:

The parking and patient drop-off area is lit solely by the six pole-mounted luminaires shown on the plan. While these fixtures provide adequate lighting for functional use of the lot, the design lacks interesting features and fails to accentuate the architecture of the Critical Care Building. My primary design changes regarding this space will focus on illuminating the building façade and creating an environment that is both interesting and functional. Floodlights focused on the curtain wall would create sparkle on the glass of the façade and bring out the texture of the architectural masonry. Specific design considerations follow in the design criteria outline.

Space 4 (Outdoor Space): Parking and Patient Drop-off

Lighting Plan



The images above are small sections taken from architectural sheet ES1.01 of the Geisinger Critical Care Building plans. The full drawing is included electronically under file name 04136ES1.01.pdf.

Space 3 (Circulation Space): Main Waiting Area/Corridor

Design Criteria Outline:

A.) Appearance of Space and Luminaires

- a.) Luminaire appearance is not particularly important within the space, though fixtures should be selected to match existing GWV exterior luminaires.

B.) Color Appearance

- a.) Color appearance is important for luminaires that will be used as accent lighting on the building façade.
- b.) Warmer correlated color temperatures will highlight building finishes more attractively than cooler temperatures, so floodlights with halogen lamps will be a good choice for these luminaires.

C.) Direct Glare

- a.) Direct glare is an important issue in the space for safety reasons.
- b.) Mounting height is an important consideration for pole-mounted luminaires and careful aiming of floods will reduce glare issues for site.

D.) Light Distribution on Surfaces

- a.) Safety is the key factor when designing lighting for the space, so adequate average horizontal and vertical illuminances is paramount; IESNA Lighting Handbook Chapter 22 lists minimum requirements at 0.5 fc (horizontal) and 0.25 fc (vertical) with a uniformity ratio of 15:1.
- b.) Lighting of building façade should not be uniform, but should have an interesting use of light and shadow in order to accentuate building architecture.

E.) Modeling of Faces/Objects

- a.) Modeling of faces and objects in the space is important, again, for safety reasons and visual recognition of environment (minimum vertical illuminance level listed in previous section)

F.) Sparkle/ Desirable Reflected Highlights

- a.) Sparkle is a good method for creating visual interest on building surfaces, as described previously.

G.) Special Considerations

- a.) Light trespass for this area is not important because surrounding lots are owned by Geisinger.
- b.) No urban skyglow requirements were listed for Plains, PA.