Army National Guard Readiness Center

AE 482 Submission 1

Ian Herron | Lighting/Electrical AE Faculty Consultant |Dr. Kevin Houser 2/4/2011



Computer files located at Y:drive ijh5004_Thesis_Submission_1

AE 482W Submission 1 | Army National Guard Readiness Center Addition

Contents

Executive Summary	2
Existing Conditions:	3
Proposed Design:	8
Power Density Calculations	14

Executive Summary

The first space to be designed is the large work space, which in this case is the open office. The previous design used direct/indirect linear pendants over the workstations, which provides adequate ambient light while still providing some shadows to render objects better. Recessed direct luminaires illuminate the circulation at the left. The proposed lighting solution will take advantage of the rigidity of the space by utilizing task/ambient fixtures integrated with the furniture. Tambient's luminaires will be used to accomplish this design.

The new design managed to concentrate all the direct lighting onto the work surfaces while the indirect lighting provided an adequate amount of illumination for the circulation paths though. Power density is well below the ASHRAE 90.1 standard of $1.1W/ft^2$ at $8.4W/ft^2$

Existing Conditions:

On almost every floor of the building there is a large open office, each very similar to the others. The one that will be evaluated in this report will be the open office area located on the fourth level of the tower portion of the building (level 4T) within the northeast section. This one was chosen because it appeared to be the most similar to the others. An exterior glass and aluminum curtain wall system makes up the entire north and east walls, allowing a large amount of natural light to enter the space. To the south and west of the office space are partition walls that separate the space from smaller, individual offices. There are two different ceiling types, a 2x2 acoustical ceiling at 9'6" and a GWB ceiling at 9'0". The space will be comprised mostly of cubicles in sections of 6 to 8, each with its own desk and computer. Therefore, intensive VDT use is a design consideration within the space. Also, reading of various text sizes and styles will be a major task taking place within the space.

Materials

Floor- CPT-2: Modular Carpet Tile

- Description: Manufacturer- Constantine; Color- R252200;
 Pattern Name-Narrow
- Reflectance: 0.2

Ceiling- CLG1- Gypsum Wall Board

- Description: Bright White, Flat Sheen
- Reflectance: 0.76

ACT1- Acoustical Ceiling Tile and Grid

- Description: 2' X 2', White finish
- 0.8

Base- WB-1: Wood Wall Base

- Description: Color- Alabaster
- Reflectance: 0.3

North Wall- G6: Vision Glass

- Description: 3/4" Clear Glass (Specific glass type not chosen at this time)
- Reflectance: 0.25 (assumed)
- Transparency: 0.75 (assumed)

East Wall- G6: Vision Glass

- Description: 3/4" Clear Glass (Specific glass type not chosen at this time)
- Reflectance: 0.25 (assumed)
- Transparency: 0.75 (assumed)

South Wall- GWB1: Gypsum Wall Board

- Description: Eggshell Sheen
- Reflectance: 0.5

West Wall- GWB1: Gypsum Wall Board

- Description: Eggshell Sheen
- Reflectance: 0.5



Technical Report 1 | Army National Guard Readiness Center Addition



Technical Report 1 | Army National Guard Readiness Center Addition



Figure 3: Open Office Reflected Ceiling Plan



Figure 4: Existing Lighting Plan

Proposed Design:

The existing lighting design uses direct/indirect linear pendants over the workstations, which provides adequate ambient light while still providing some shadows to render objects better. Recessed direct luminaires illuminate the circulation at the left.

My proposed lighting solution will take advantage of the rigidity of the space by utilizing task/ambient fixtures integrated with the furniture. Tambient's luminaires will be used to accomplish this design. The advantage that these luminaires should have over the pendants is that the direct component of the light will be focused on where it is truly needed, the desk surfaces. This will ensure that the direct lumens will not be wasted on areas of circulation where the indirect light will illuminate. Recessed, direct luminaires will still be utilized to illuminate the walkway at the left.

Open Office Luminaire Schedule											
Туре	Description	Manufacturer	Catalog NO.	No. of Lamps	Lamp type	Watts Per Lamp	Ballast Type	BF	Input Wattage	Voltage	Height
OA	Integrated task/ambient luminaire	Tambient	L221-83S7- M-TASL-1- 1-R-00-35	2	Sylvania 1 FP28/835/ECO-2900 Lumens CRI-85 T5 3500k and 1 FP21/835/ECO 2100 Lumens CRI-85 T5 3500K	49W Total	Sylvania QTP 2x28T5/UNV PSN NL	1	65/63W	120	4'-6"
ОВ	Integrated task/ambient luminaire	Tambient	L221-48S4- M-TASL-1- 1-R-00-35	1	Sylvania FP28/835/ECO-2900 Lumens CRI-85 T5 3500k	28W	Sylvania QTP 2x28T5/UNV PSN NL	1	32W	120	4'-6"
ос	2' X 2' Direct recessed downlight	Ledalite	9422-D2- ST-2TT5-S- 1-277V	1	Sylvania FT40W/2G11/RS/835	40W	Sylvania QTP 1x40TT5/277 PSN-F	0.88	37W	277	9

Light Loss Factors					
Luminaire Type	LLD	LDD	BF		
OA	0.95	0.95	1.00		
OB	0.95	0.95	1.00		
OC	0.9	0.95	0.88		



Figure 5: Proposed Lighting Plan

AE 482W Submission 1 | Army National Guard Readiness Center Addition



Figure 6: Pseudo Color Plan

11



Figure 7: Pseudo Color Perspective



Figure 8: Gray Scale Perspective



Isoline Color	Illuminace Value (fc)
Black	10
Blue	15
Green	20
Red	40
Yellow	60

According to the AGI data, the majority of the light is concentrated on the task surfaces where the highest illuminance is required. IESNA recommends at least 30fc on the horizontal plane and although the results show only an average of 27fc, it is taking into account the spaces in between the desk surfaces where direct light is aimed away from. Judging from the pseudo, it is apparent that the actual work surfaces are getting more than the required amount.

Two circulation paths were defined within the space, one to the left of the office and one in the center. IESNA requires only 5fc for a corridor; therefore the 10fc in the center provided by the indirect lighting is adequate for movement through the office. The left pathway is illuminated more in order to draw attention to the offices around the perimeter.

Power Density Calculations

Square Footage= 70512ft²

Power (Watts)= 80(OA)*65W+10(OB)*32W+10(OC)*40W

Power Density = $5920/70512 = 0.84W/ft^2$

Ashrae 90.1 Allowed Power Density = $1.1W/ft^2$