The Web Shop

AE 482 Submission 1

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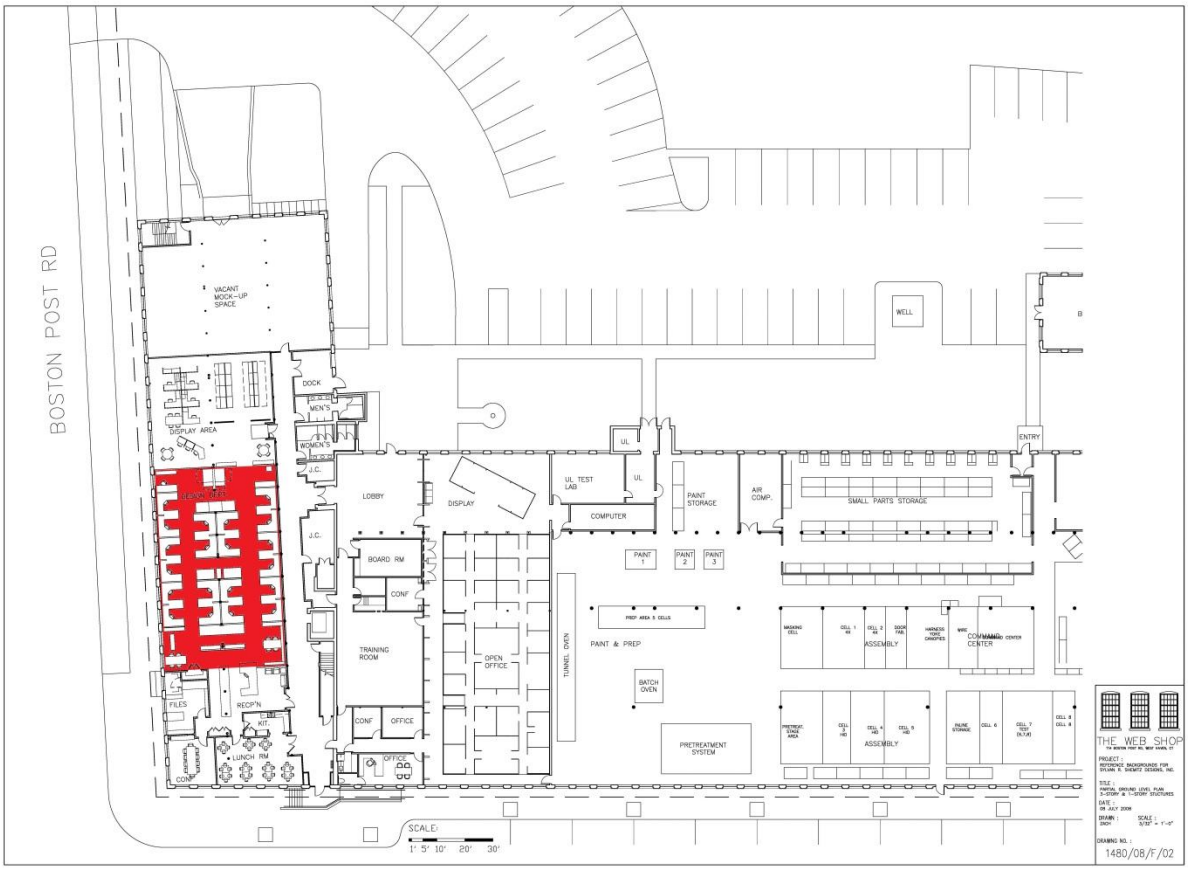
Files Located at P:\AE482

General Building Statistics:



Work Space – Open Plan Office – shown to the left in red

Existing Conditions

Description:

This open office is the smaller of the two offices at 71’ x 44’. However with 13’ walls and exposed wood beams and columns, it is the more aesthetically pleasing of the two. Natural daylighting comes from the North facing wall. The cubicles are used primarily for VDT usage.

Materials:

Floor:

Dark blue carpet on raised floor.

Reflectance: 0.2 (assumed)

Ceiling:

White acoustical tile.

Reflectance: 0.8 (assumed)

Accents:

Red paint. Semi-gloss.

Reflectance: 0.25 (assumed)

Walls:

White paint on gypsum wall board.

Reflectance: 0.5 (assumed)

Woodwork:

Beams and columns.

Reflectance: 0.5 (assumed)

Furniture:

Cubicles.

Reflectance: 0.5 (assumed)

Wall Hangings:

Paintings and white boards.

Reflectance: 0.5 (assumed)

Glass:

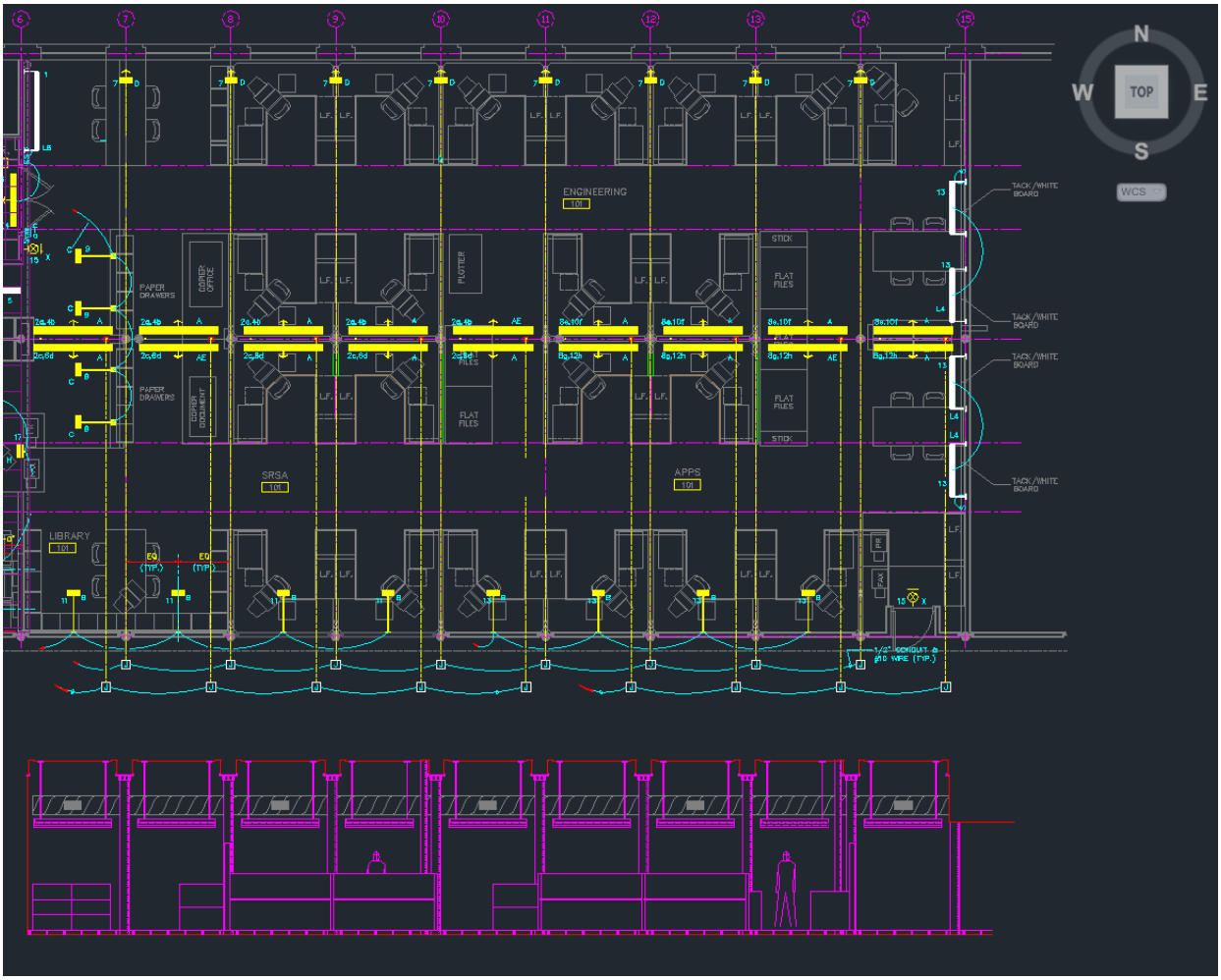
Windows.

Reflectance: 0.15

Transmittance: 0.85

Existing Conditions

Lighting Plan and Elevation:



Existing Conditions

Photographs:

Existing Conditions

Lighting Equipment:

General ambient light in the work space is provided indirectly by 18 custom F113 fixtures, which illuminate the ceiling. This is supplemented to some degree by wall grazing. The north wall is grazed between the large windows by tungsten halogen T099 fixtures. The south wall, which has no windows, is grazed by metal halide M101 fixtures. The east wall has 4 white boards, which are highlighted by linear fluorescent F101 fixtures. The west end of the space has a 7 foot partition wall that is grazed with artwork by 4 compact fluorescent F111 fixtures.

Schedule:

Lighting	Name	Mounting	Type	Qty.	Lamps Ea.	Watts Ea.	Watts Tot.
Uplight	Elliptipar F113	Pendant	A	18	6-Twin Tube Flu.	351	6348
Wall Wash	Elliptipar M101	Cantilever	B	8	1-Ceramic MH	195	1560
Wall Wash	Elliptipar F111	Cantilever	C	4	1-Qaud Tube CFL	34	136
Wall Wash	Elliptipar T099	Wall Mount	D	8	1-Tungsten Halo.	50	400
Wall Wash	Elliptipar F101	Cantilever	L4	4	1-T8 Linear Flu.	34	136
							8580

Design Consideration

Design Criteria:

Open plan office - Intensive VDT use, Hand written tasks, Printed tasks

Illuminance Values

- Horizontal - 30 fc
- Vertical - 5 fc

Direct Glare- Very Important

- Direct glare can cause visual discomfort and interfere with visibility of the occupants. Its main causes are from luminaire placement and natural light coming in through windows. Because reading and writing will be two tasks being performed by the occupants, it is crucial to control this problem in order for work to be done properly. Considerations to prevent this lie in use of indirect instead of direct light sources, luminaire placement, and placement of seating around fenestrations.

Reflected Glare- Very Important

- Reflected glare can be caused by light refracting off of shiny or glossy surfaces such as magazines. Veiling reflections from such surfaces can cause visual discomfort and reduce contrast on the surface. It is very likely that the occupants will be reading text glossy paper so reflected glare should not be ignored. This problem can be solved in much the same way direct glare can.

Luminances of Surfaces- Very Important

- Luminance values should be uniform on all surfaces; including floor, wall, ceiling, and work plane in order to reduce visual clutter and distractions. However, a slightly higher luminance value may be desired on work surfaces in order to direct focus to the work of the occupants.

Light Distribution on Task Plane (Uniformity) - Very Important

- Uniformity on the task plane is important for visual clarity while performing tasks such as reading and writing. Any type of patterns is undesirable for they will be distracting to the occupants.

Source/ Task/ Eye Geometry- Very Important

- Luminaires should be kept away from the offending zone to reduce reflections. Indirect lighting and luminaires placed to the sides of the desks will help avoid these problems.

Appearance of Space and Luminaires- Important

- It is important that the space be bright and uniformly illuminated to avoid visual distractions and clutter. Areas of circulation should stand out in order to guide foot traffic.

Color Appearance (and Color Contrast) - Important

- Color appearance can affect visibility and aesthetics. Proper color rendering is crucial for producing a pleasant looking space and complementing the appearance of the occupants. Contrast is required for distinguishing text in reading applications.

Daylighting Integration and Controls- Important

- Daylighting integration is important for reduction of lighting load and to provide high quality light or light with exceptional color rendering. The space receives an ample amount of natural light due to the fact that about 50 percent of its walls are exterior glazing. However, measures need to be taken to control the amount of daylighting such as shading in order to reduce glare or excessive solar heat gain.

Modeling of Faces and or Objects- Important

- Within the work environment, it is often important for people to converse with one another and share ideas. Therefore, it is necessary that the occupants' faces are rendered in a pleasant manner in order to optimize social interaction.

Power Allowances and Control Requirements (ASHRAE 90.1):

ASHRAE 90.1 states that the maximum power density for an office space, using the Space-by-Space Method, is $1.1W/ft^2$. As for lighting controls, because the building is over 5000 ft^2 "all interior lighting shall be controlled with an automatic control device to shut off building lighting in all spaces."

Solution

The existing design is thorough and provides a wonderful work environment. But there is much that can be improved. The abundance of indirect lighting is inefficient. This has a lot to do with the distance the light must travel before reaching the task surface. Indirect lighting can give the appearance of a cloudy day, which is great for uniformity, but not the best for visual clarity.

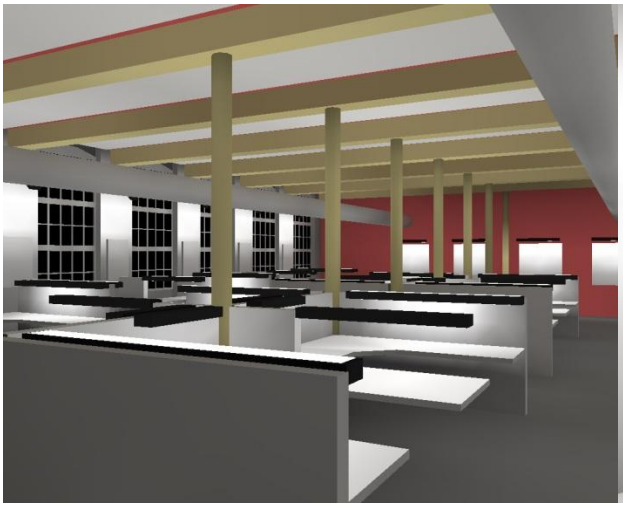
The goal is to retain the visual appeal, increase occupant comfort, and save energy. My solution is to use task-ambient fixtures mounted on the cubicle dividers. This solution has several benefits. First, by providing direct lighting to the task surface as opposed to indirect lighting, visual clarity is increased. Mounted at eye level, it brings the light to where it is most needed. Next, the uplight component of the task-ambient fixtures addresses the need for ambient lighting in such a large space. This helps to provide visual appeal to the space. Furthermore, there is no direct glare on computer monitors due to the mounting height of the fixtures.

A task-ambient solution is the best compromise of all considerations. By getting the light closer to where it is needed, it not only looks great and is functional, but it also is energy efficient.

In addition to the task-ambient lighting, wall washing was used to some degree on all walls. On the north wall, artwork was highlighted between windows. On the east wall, four whiteboards were illuminated. The south wall was lit uniformly. And the west wall is a partition that does not meet the ceiling and is washed to highlight artwork.

Solution

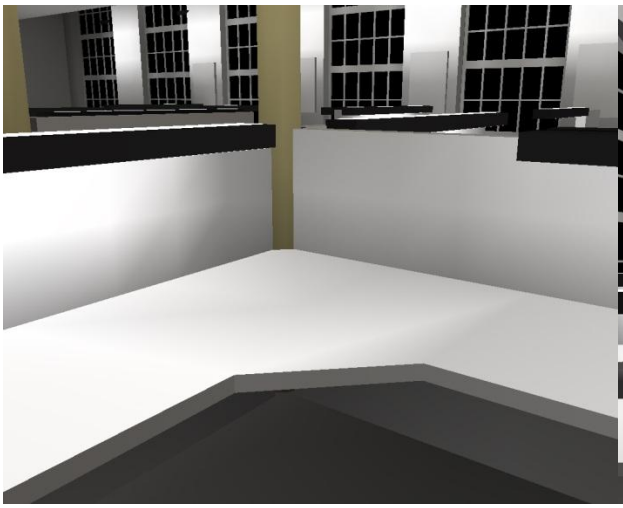
AGI Renderings



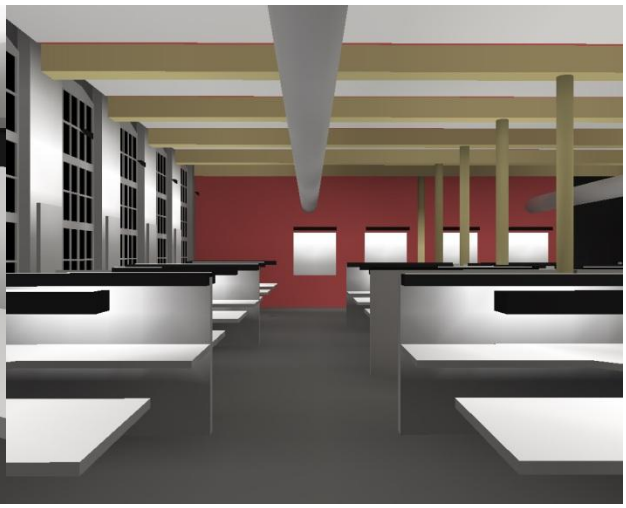
Above is looking north-east

Above is facing south-west

Below is facing north-west

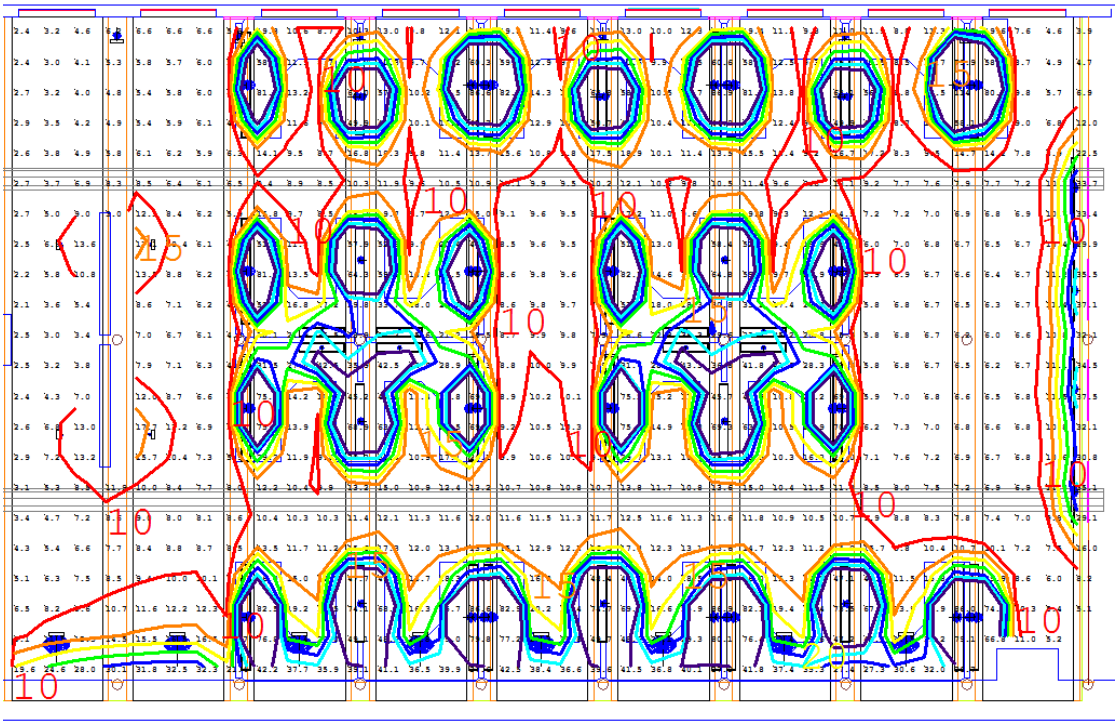


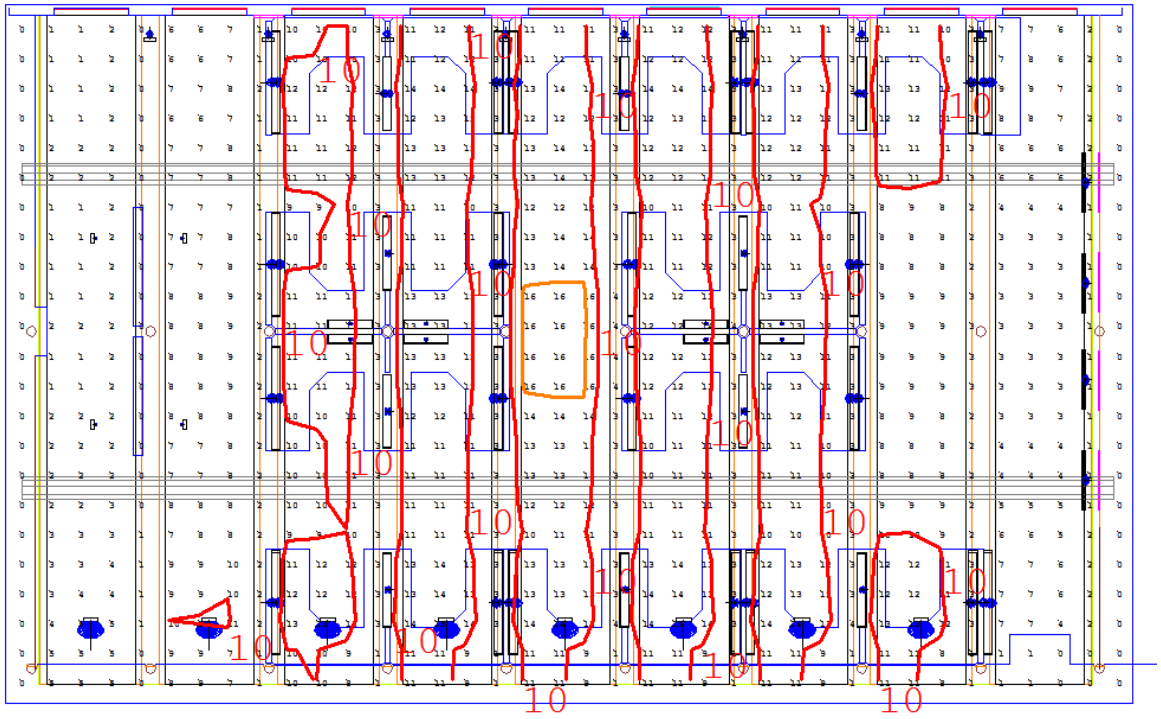
Below is looking east



Solution

Isolines: Above is the Work Plane. Below is the Ceiling Plane.





Solution

Fixture Schedule

Lighting	Name	Mounting	Type	Qty.	Lamps Ea.	Watts Ea.	Watts Tot.
Wall Wash	Elliptipar M101	Cantilever	B	8	1-Ceramic MH	70	560
Wall Wash	Elliptipar F111	Cantilever	C	4	1-Qaud Tube CFL	34	136
Wall Wash	Elliptipar T099	Wall Mount	D	8	1-Tungsten Halo.	50	400
Wall Wash	Elliptipar F101	Cantilever	L4	4	1-T8 Linear Flu.	34	136
Task-Amb	Tambient L201		T1	16	1-4' T5, 1-3' T5	49	784
Task-Amb	Tambient L201		T2	3	1-5' T5	35	105
Task-Amb	Tambient P201		T3	6	1-4' T5, 1-3' T5	49	494
Task-Amb	Tambient P201		T4	7	1-5' T5	35	245
Task-Amb	Tambient P201		T5	8	1-3' T5HO	24	192
							3052

Power Consumption:

The new design uses approximately 36% of the power of the existing design.

Power Density:

3052 watts per 3572 square feet is 0.854w/sf, which is a big improvement from 2.402 w/sf