

## **Tech Report 1B: Lighting Existing Conditions and Design Criteria Report**

In order to test whether the lighting system designed for Hyattsville Library, designed by Weigand Associates, met IES illuminance recommendations, I used AGi 32. I created a model of the main open area of the library using the IES files from the specified luminaires from the luminaire schedule, or a similar substitution. Every luminaire in the building is LED, so I applied a 0.8 light loss factor, because that is the LLF that the lighting designer at Weigand Associates always uses and I am testing her design. I used the control narrative and Comcheck reports to find that the current design satisfies all of the requirements I observed. The most up to date LEED checklist I was given lists a spread of 36 points in the ? or maybe category. What this means is the design could be anywhere from LEED accredited to LEED gold, depending on finishing touches and construction. For example I can assume they received the credit for renewable energy since there is a solar array on the roof, but I do not know if they will earn the credit for daylight and views. When I redesign the building, I would like to have the building reach at least gold rating if not platinum.

The open area I modeled has four major areas with people doing different tasks. The first area that takes up most of the east side is a combination seating/collection area. This creates an issue with lighting, because to light a library stacks the most important thing is the vertical illuminance on the stacks, whereas where there are chairs and desks it is most important to provide ample horizontal illumination for reading. In the current lighting design, I found that all of the vertical and horizontal illuminance recommendations are exceeded for all of the areas with stacks in the library where I tested the lighting design. The current design however did not meet IES recommendations when I tested the reading areas' horizontal and vertical illuminances, which could be caused by my inaccuracies in architecture geometry or the IES files I used. If it is not my mistake however, then the design does not provide sufficient illuminance for reading text and should be improved. The next area of interest within the open area is the children's section. In addition to stacks and a few places to sit like in the main stack area, but there are also raised platforms with toys or playhouses for children to play in. These specialty areas have dedicated luminaires different from the rest of the building that provide more than enough illuminance for children and parents alike. In between the children's area and the main collection/seating area is the young adults section. This section is small and is lit by circular pendants that continue on down the middle of the large space and to the circulation desk. The space near the circulation desk is the final space I wanted to test of the large area, because it is important to be able to see the desk from all over the library. It is also important to see the face of the person behind the desk well, so the horizontal and vertical illuminances need to be sufficient, which they are in the current design.

Overall the lighting design of Weigand Associates is very good and meets almost all codes requirements and IES recommendations. The only issue area is the seating areas scattered around the library, including desks, desks with computers, and multiple types of chairs. In order to fix this problem, I will redesign the collection/seating area to meet IES recommendations for each task as well as using lighting to create psychological impressions to support those tasks. In

the areas with a lot of seating, I want to create a private feeling using more illuminance in the centers of the areas. In the areas with stacks however, I want to create a more public feel as a person travels through the library. The feeling of public versus private in these spaces will also have the added effect of supporting travel through the stack areas instead of the seating areas, giving people reading some personal space and privacy.

### **Types of luminaires**

- 8' Indirect/direct pendants
- 4' & 8' Wall slot, uplights, and downlights
- 8' Curved downlight
- 2-4" round and square downlights
- 2'x2' troffer
- LED panels
- 5' horizontal sconce
- Integrated handrail LEDs
- LED tape light
- 4' & 8' ring pendants
- 6" Wall washers
- Exit signs
- Conical light
- Beam spot light
- 4' linear striplight

**Type of lamps** – All LED lamps, appropriate for their respective fixtures.

**Type of ballasts/drivers** -All drivers for LEDs, including: 0-10V dimming, electronic drivers, low voltage, AC to DC power, AC to DC and 0-10V dimming, emergency, and fixed output drivers.

**Types of control devices** -Leviton GreenMAX and Leviton controls

- Photocell daylight sensor – in computer room, children's play room and overall library
- Occupancy sensors – dual tech (infrared and ultrasonic), override on/off, 10 min time delay to stay on and some infrared sensors
- Power packs – goes in 4" x 4" junction boxes, rated for fluorescent lighting, LED lighting, and motors under 2HP
- Digital wall switches – low voltage, 2-button and keyed switch available, 0-10V dimming
- Line voltage wall switches
- Low voltage wall switches

### Daylighting elements

- Large windows on all sides
- North facing curtain wall to patio
- Multi-level roof creates clerestory effect
- Windows used: Guardian SunGuard, SuperNeutral 54, 54% VGT, 0.28 SHGC

### Spatial properties

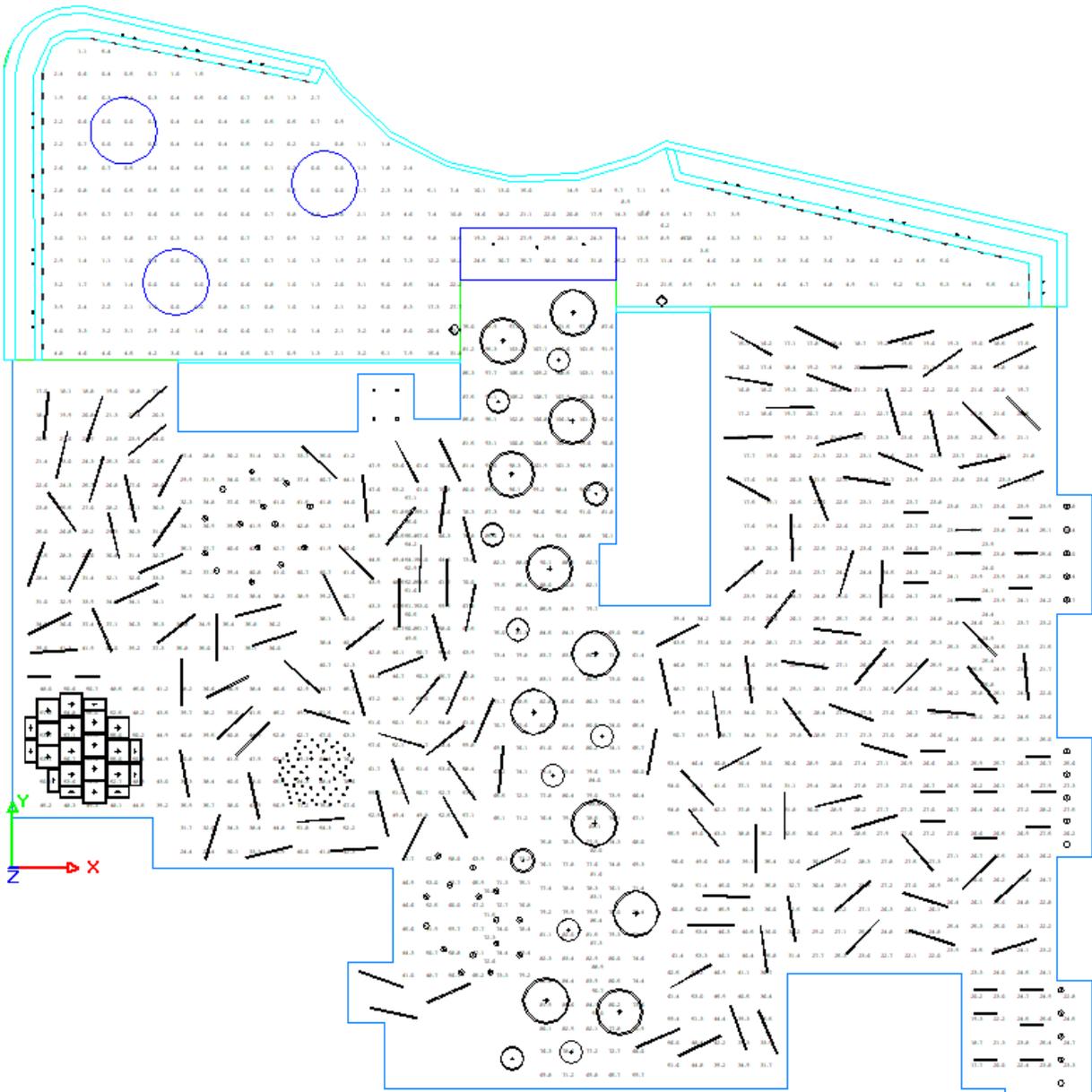
Material	Reflectance or Estimated Average Reflectance	Location
Carpeting	0.3 (avg.)	Main Library areas, Children's area
Painted Walls	? (0.8 guess)	all, but vestibule, elevator lobby, and bathrooms
Acoustical Ceiling Tile	0.85	Open areas, study rooms, and most support spaces
Light Concrete	0.34	Parking garage, Patio flooring
Terra-cotta	0.35	Exterior walla

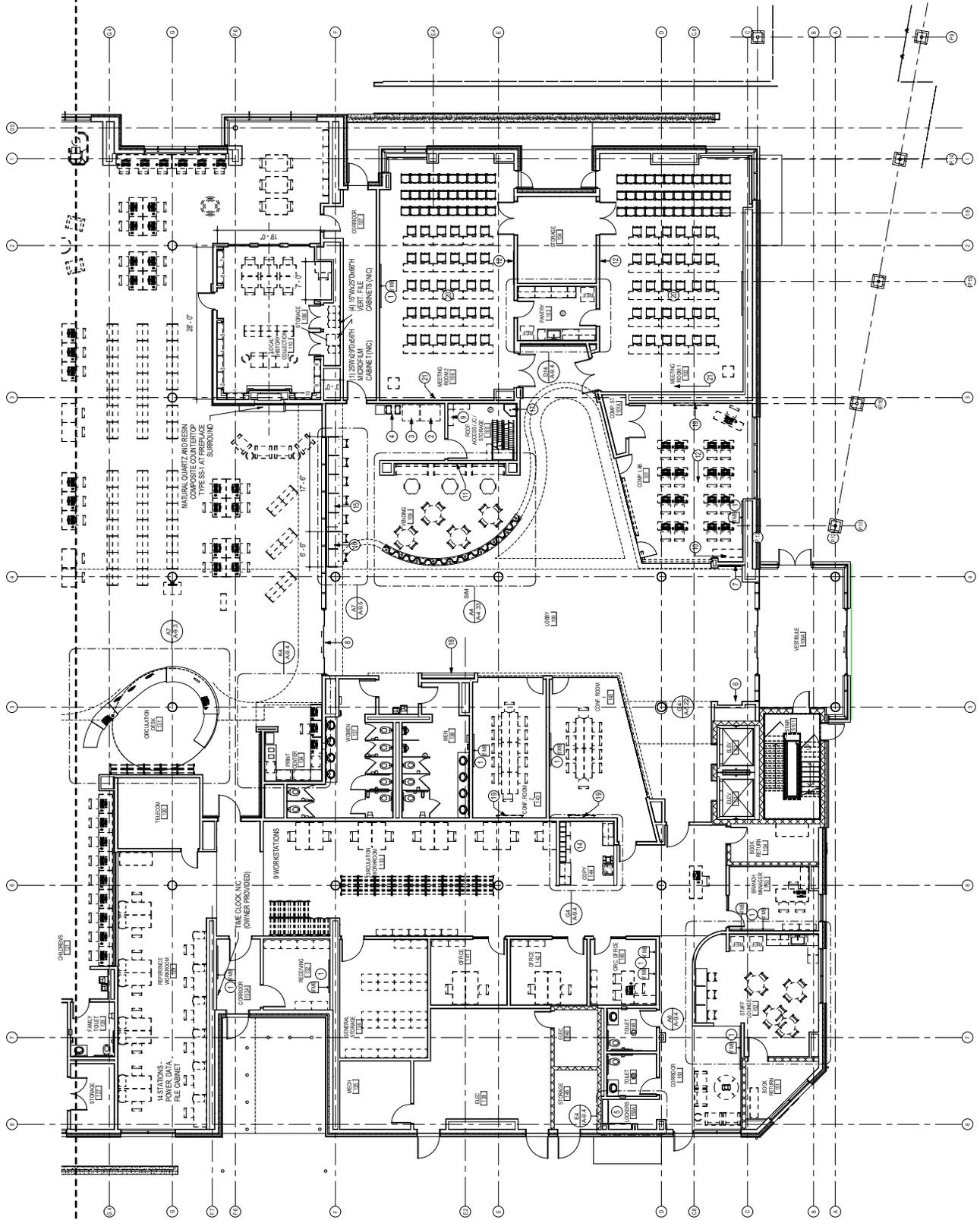
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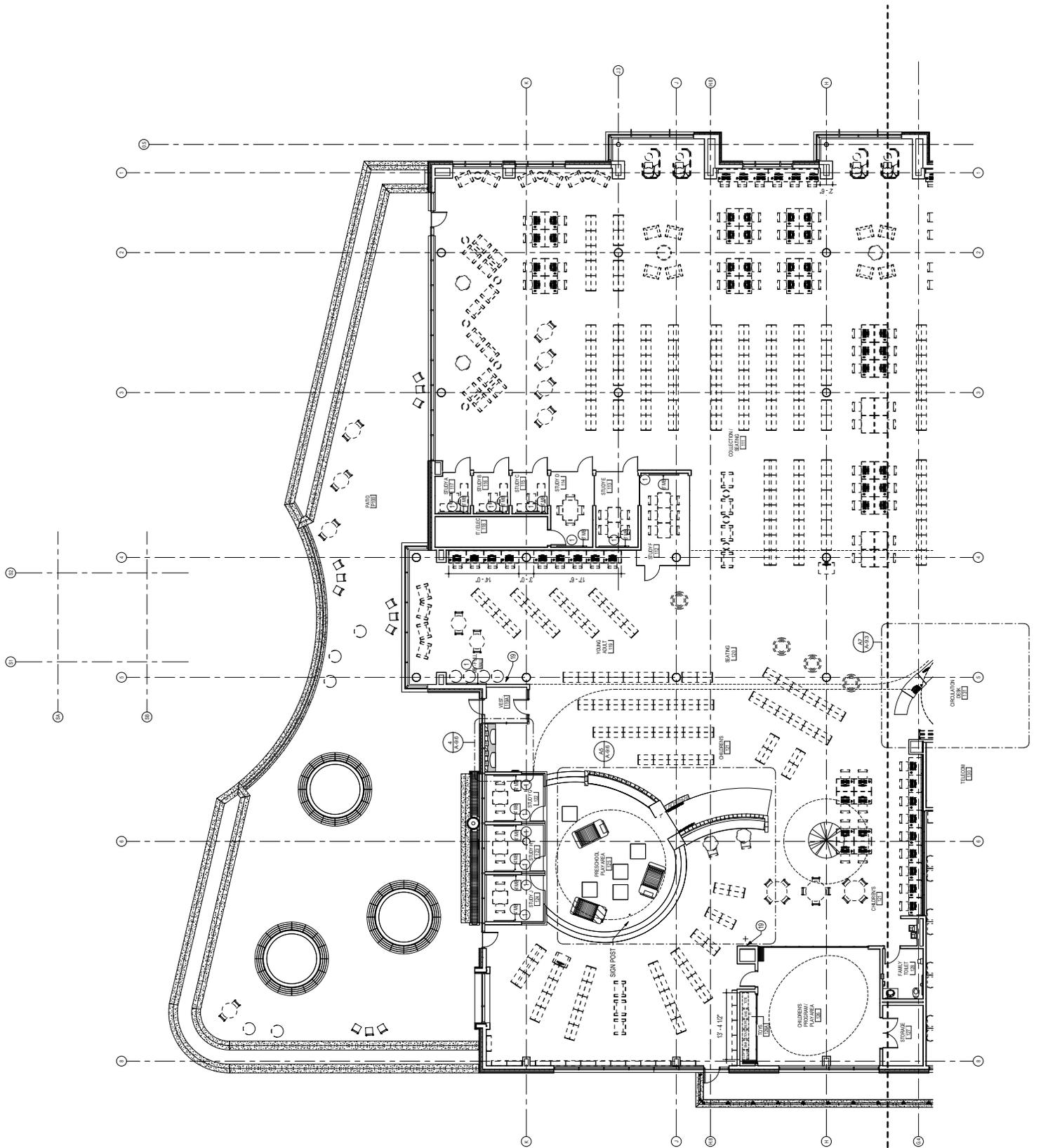
- 2015 IECC
- ASHRAE 90.1, 2013

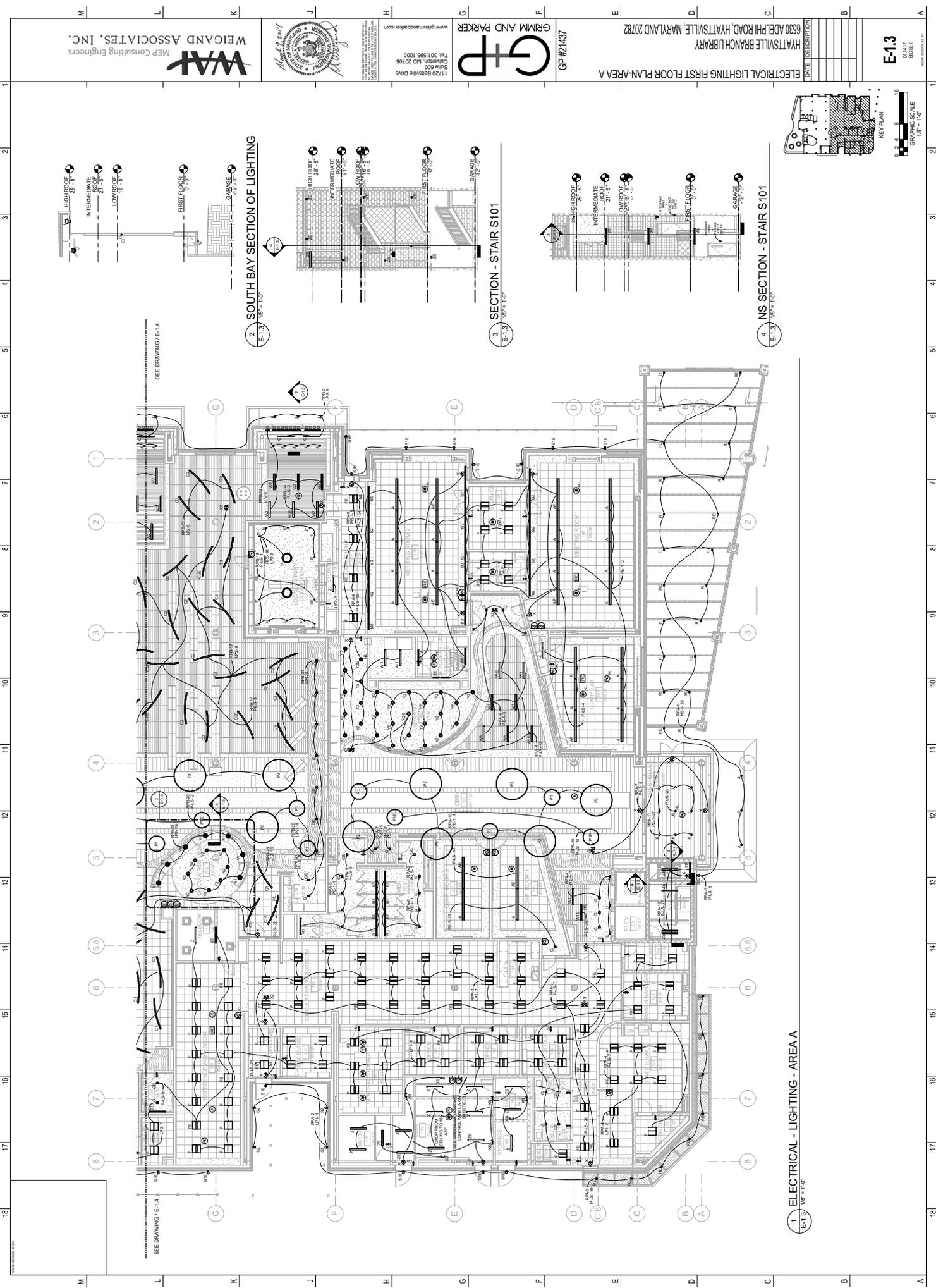
Code Requirement	Source	Goal	Current design
LPD	IECC 2015	1.19 library 0.21 parking garage	1.037 0.197
Lighting reduction controls	IECC 2015	At least 50%	Yes
Occ. Sensor automatic shutoff	IECC 2015	Within 30 mins	Yes
Manual-on or auto-on to 50%	IECC 2015	Yes, or less than or equal to 50%	Yes
Manual control present	IECC 2015	Yes	Yes
On-site renewable energy	LEED 2009	Yes	Yes
Daylight and views	LEED 2009	Yes	?
<b>Illuminance Recommendation</b>			
Circulation desk	IES Handbook	Eh = 500 lux @2.5' AFF Ev = 200 lux 5' AFF Hor. avg/min = 2:1	Eh = 619 lux Ev = 718 lux Hor. avg/min = 1.5:1
Book stacks general	IES Handbook	Eh = 200 lux Hor. avg/min = 2:1	Eh = 448 lux Hor. avg/min = 1.8:1
Book stacks shelving	IES Handbook	Eh = 300 lux @2.5' AFF Ev = 100 lux @1' AFF, 200 lux @2.5' AFF Hor. avg/min = 2:1 Vert. avg/min = 4:1	Eh = 451 lux Ev = 531 lux Ev = 536 lux Hor. avg/min = 1.6:1 Vert. avg/min = 1.1:1
General	IES Handbook	Eh = 100 lux Ev = 30 lux @5' AFF Hor. avg/min = 2:1	Eh = 770 lux Ev = 855 lux Hor. avg/min = 1.4:1
Reading areas	IES Handbook	Eh = 500 lux @2.5' AFF Ev = 200 lux @4' AFF Hor. avg/min = 2:1	Eh = 273 lux Ev = 246 lux Hor. avg/min = 1.8:1
Patio			Eh = 52 lux Ev = 62 lux

### AGi 32 Calculations





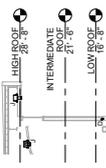




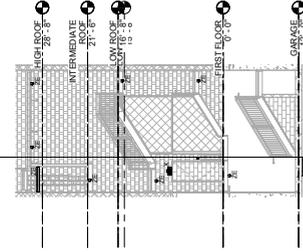
SEE DRAWING E-14

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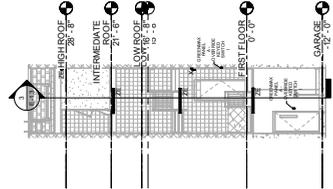
1. ELECTRICAL - LIGHTING - AREA A  
E-13 1/8" = 1'-0"



2. SOUTH BAY SECTION OF LIGHTING  
E-13 1/8" = 1'-0"



3. SECTION - STAIR S101  
E-13 1/8" = 1'-0"



4. NS SECTION - STAIR S101  
E-13 1/8" = 1'-0"

KEY PLAN  
E-13  
BO SET  
GRAPHIC SCALE  
1/8" = 1'-0"

DATE	DESCRIPTION

ELECTRICAL LIGHTING FIRST FLOOR PLAN-AREA A  
HYATTSVILLE BRANCH LIBRARY  
6530 ADELPHI ROAD, HYATTSVILLE, MARYLAND 20782

GRIMM AND PARKER  
GP #21437

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MEP Consulting Engineers  
WAI

E-13  
E-13  
BO SET  
GRAPHIC SCALE  
1/8" = 1'-0"



