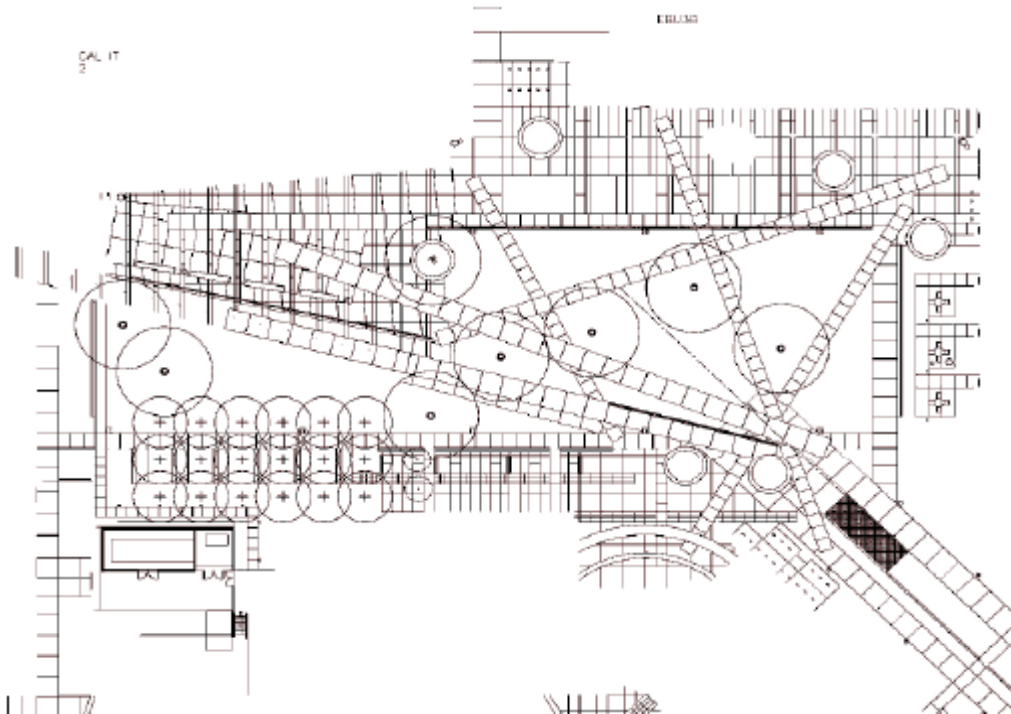


Academic Courtyard

The academic courtyard contains an open grassy area in the Jabocs School of Engineering at the University of California, San Diego. Three other buildings and Cal IT² form this courtyard in the middle with small grassy areas, trees, a sculpture, and benches for a nice break in the afternoon sun. The courtyard is the place that leads into the main lobby and underground tunnel of Cal IT². It is approximately 280 ft x 95 ft with concrete walkways in all directions leading to all ends of the rectangular space. This space is primarily used for walking from one building to the other. During breaks and peak times, you can find students and colleagues enjoying the sun and outside air in this space. A large concrete patio exists in front of Cal IT² with a concrete ramp leading down to the tunnel. This is a very open area and is very open to design. One stipulation as stated by the UCSD Facilities Office is to use low pressure sodium lamps for all pole mounted fixtures, as well as use full-cut where ever possible.



Design Criteria

Reflectances

A ground reflectance was not considered in this study. Only direct illuminance was studied for safety conditions.

Theme

The general lighting theme for the academic courtyard was to provide a safe walking atmosphere during the nighttime hours while complying with the University of California, San Diego's lighting policies. Low pressure sodium lamps, which generate a deep orange glow, were chosen due to the existing lighting conditions which already exist on the rest of the campus. The up-lighting on the trees add some depth to the space with a more aesthetic look taking over the deep orange glow of the pole lights.

Horizontal Illuminance

In the courtyard, a horizontal illuminance of 0.5 fc is required for safety and pedestrian identification at night from IES standards. Building exterior entrances should be highlighted as well as stairs and ramps for safety concerns.

Vertical Illuminance

In the courtyard, a vertical illuminance of 0.5 fc is also required by IES standards.

Glare Considerations

Glare could be an issue when walking down the concrete paths towards the 20' poles and up-lights on the trees. Since they are relatively tall compared to the average person, it shouldn't prove to be a concern, but attention should be paid to it.

Facial Recognition

Facial and body recognition is a major factor in the lighting design for this space. For safety matters, my redesign should pay attention to the vertical illuminance on a person and deleting any major dark spots where a person can hide.

Light Pollution

Light pollution is another concern that should be considered. Since all the poles in this courtyard have a type IV distribution, most of the light should not escape into the atmosphere.

Color Temperature Appearance

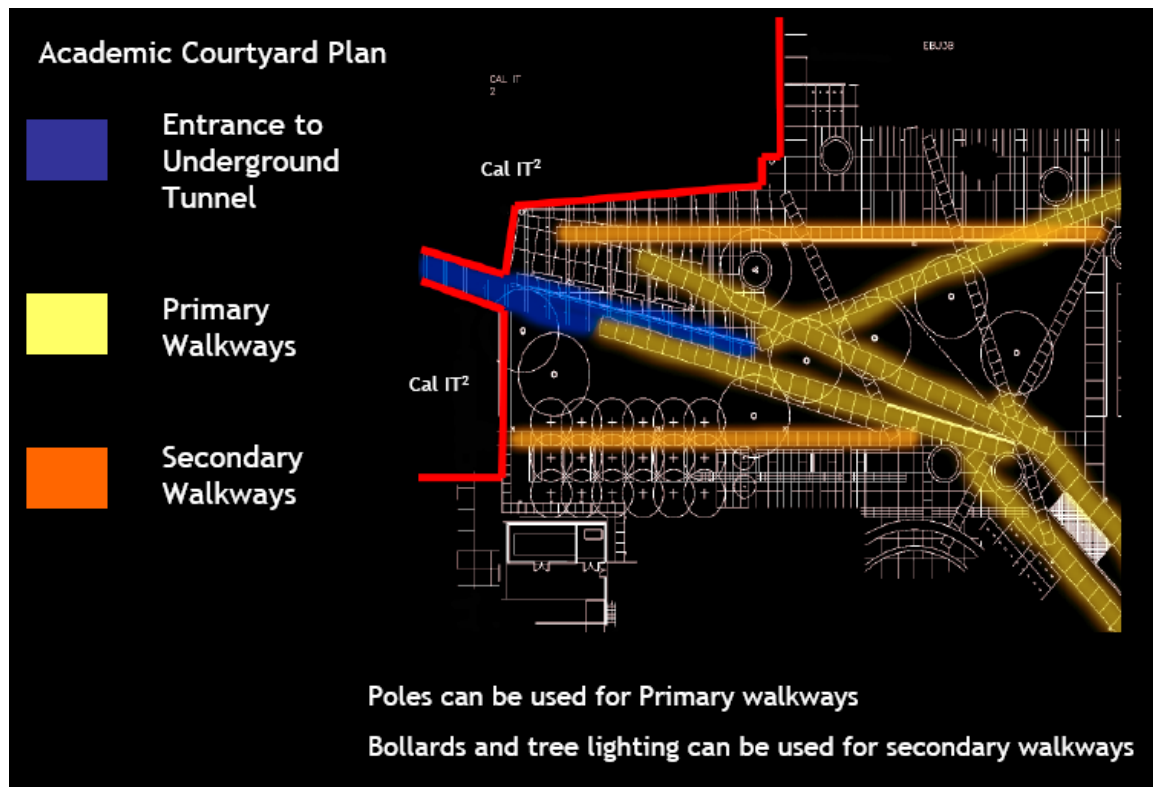
For these particular fixtures, the color temperature will be very low (1700K). The low pressure sodium lamps create a deep orange glow which won't render certain colors very well. By adding another layer of cooler color temperature metal halide lamps, better color rendering will be possible.

Power Density

According to California Title 24 Energy Standards, an exterior courtyard's power density should be < 0.2 W/SF.

Schematic Design

In my redesign, I will be paying particular attention to the University of California, San Diego's Lighting policies. Based on their requirements as stated earlier, I will be using low pressure sodium pole lights to keep the theme from the rest of campus continuing. I will, however, add some more depth to this courtyard with cooler color temperatures to emphasize the technology of Cal IT² and the surrounding engineering facilities. Use of brighter lights will be used to highlight the entrance to the underground tunnel to promote its use as well as introduce people to the lighting display in place as will be discussed in the next space.



The following two concept diagrams exhibit the ideas described above. In my redesign, the only concept I changed since the schematic was the accent lighting on the sculpture. I didn't want the sculpture to be highlighted since the main focus of the courtyard is really the glowing Cal IT² building.

UCSD Cal IT² San Diego, CA

Some Lighting Concepts



Downlighting on open canopy for entrance to tunnel



Up-lighting for patch of trees

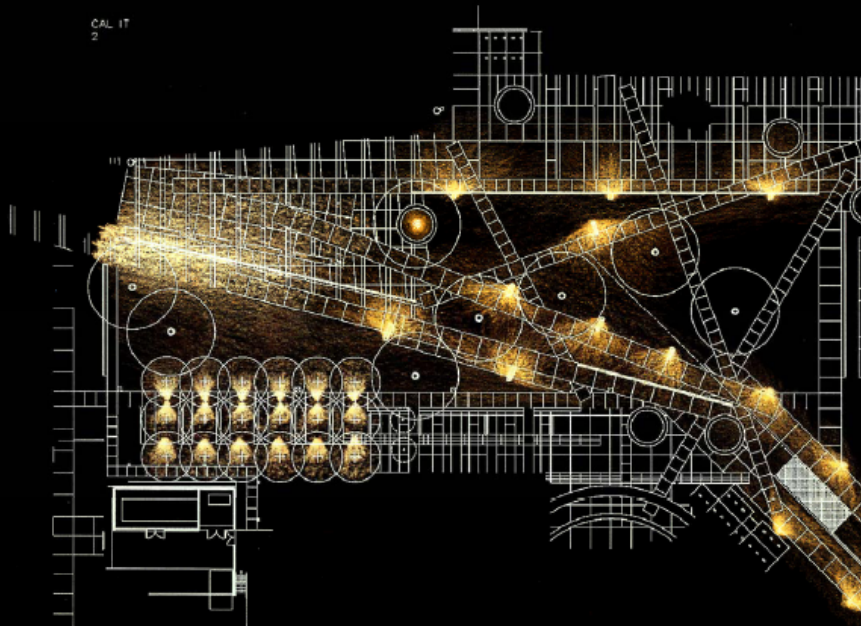
Low Pressure Sodium pole lighting for primary walkways to keep continuity with rest of campus. Bollards can be used for secondary walkways.

Accent lighting for teddy bear sculpture








Academic Court Lighting Scheme

CAL IT²
2



Lighting Fixture Schedule

University of California, San Diego Cal IT2

Type	Mfr/Catalog #	Lamping	Notes
E1	 Gardco LSA14-1-A-135LPS-277-BLP-LF Description:	(1) 135W LPS	Location: Academic Court
E2	 Bega 8534MH Description: Metal halide bollard with 1-39W T8 single-ended base lamp. 10" length, 6" width, 43" height/depth.	1-39W T8 single-ended base lamp	Location: Academic Court
E3	 Bega 2289P Description: Recessed compact fluorescent step light with 1-CFT9W lamp. Optics: tempered glass diffuse white lens.	1-CFT9W lamp	Location: Academic Court
E4	 Belfer 3510FPS-BHS-13-1-4 Description: Recessed compact fluorescent step light with 1-CFQ13W lamp. Optics: micro louver , tempered glass clear lens.	1-CFQ13W lamp	Location: Academic Court
E5	 B-K Lighting MC-4-444-9-C Description: Surface-mounted halogen landscape light with 1-PAR20 50W max lamp. aluminum housing. Adjustability: 180° tilt, 360° rotation lockable.	1-PAR20 50W max lamp	Location: Academic Court
E6	 Focal Point FAVB FL 1T5 1C * Description: 2" recessed fluorescent downlight with 1-F28T5 (48in) lamp (in cross-section). Optics: acrylic diffuse white lens , steel die-formed reflector.	1-F28T5 (48in) lamp (in cross-section)	Location: Academic Court
E7	 Cole Lighting LR 2W Description: Wall-mounted fluorescent step light with 1-T8 lamp (in cross-section). Optics: acrylic prismatic lens.	1-T8 lamp (in cross-section)	Location: Academic Court
E8	 io 0-03-4-100-1-4 Description: Surface-mounted LED strip light, rigid housing with LED (in cross-section). Optics: acrylic clear lens.	rigid housing LED (in cross-section)	Location: Academic Court
E9	 Bega 8729MH Description: Semi-recessed metal halide path light with 1-39W T8 double-ended base lamp. Optics: borosilicate glass diffuser.	1-39W T8 double-ended base lamp	Location: Academic Court
E10	 Elliptipar M-115-070G-E-99-2-000 Description: Canopy suspended wash light with 70W T8 metal halide lamp. Housing color to match ceiling. Optics: Clear glass lens	(1) 70W T8 MH	Location: Theater Lobby to Courtyard

All fixture cut-sheets can be found in the appendix.

Fixture Relevant Schedules

Ballast Schedule								
Ballast	Voltage	Lamp	Input Wattage	Input Current	Fixtures	Dimming	Elec/Mag	Manufacturer
BAL1	277V	(2) 32W T8	68	0.25	B1, B2, B13	Yes	E	Advance
BAL2	277V	(1) 32W CFTR	36	0.13	B3, B5, B6, B16	No	E	Universal
BAL3	277V	(1) 13W CFT	20	0.26	B7	No	M	Advance
BAL4	277V	(1) 17W U T8	17	0.08	B8	Yes	E	Lutron
BAL5	277V	(2) 42W CFTR	80	0.36	B9	Yes	E	Advance
BAL6	277V	(1) 32W T8	35	0.13	B10	Yes	E	Advance
BAL7	277V	(1) 13W CFQ	18	0.07	B11	Yes	E	Advance
BAL8	277V	(2) 32W U T8	65	0.25	B12	Yes	E	Lutron
BAL9	277V	(2) 32W T8	59	0.21	B14, B15, E7, E11, E12	No	E	Advance
BAL10	277V	(1) 28W T5	30	0.11	B18	No	E	Advance
BAL11	277V	(1) 135W LPS	135	0.2	E1	No	M	Advance
BAL12	277V	(1) 39W T6 MH	44	0.16	E2, E9	No	E	Advance
BAL13	277V	(1) 9W CFT	14	0.17	E3	No	M	Advance
BAL14	277V	(1) 13W CFQ	24	0.24	E4	No	M	Advance
BAL15	277V	(2) 28W T5	60	0.22	E6	No	E	Advance
BAL16	277V	(1) 70W T6 MH	79	0.29	E10	No	E	Advance
BAL17	277V	(1) 32W CFTR	32	0.28	B19	Yes	E	Advance

All ballast cut-sheets can be found in the appendix.

Lamp Information							
Designation	Manufacturer	Type	Bulb	Wattage	CCT	CRI	Relevant Fixtures
A	Philips	Fluorescent	T8 FL	32W	4100K	86	B1,B2,B10,B13,B14,B15,E7,E11,E12
B	Philips	Compact FL	CFTR	32W	4100K	82	B3,B5,B6,B16
C	Philips	Compact FL	CFT	13W	3500K	82	B7
D	Sylvania	Fluorescent	FBT8 FL	17W	3500K	82	B8
E	Philips	Compact FL	CFTR	42W	3500K	82	B9
F	Philips	Compact FL	CFQ	13W	3500K	82	B11
G	Philips	Compact FL	CFQ	13W	3000K	82	E4
H	Philips	Fluorescent	FBT8 FL	32W	3500K	85	B12
I	Philips	Fluorescent	T5 FL	28W	4100K	85	B18,E6
J	Philips	Halogen	MR16	50W	3050K	100	B17
K	Philips	Low Pressure Sodium	SOX	135W	1700K	NA	E1
L	Philips	Metal Halide	T6	39W	3000K	81	E2,E9
M	Philips	Compact FL	CFT	9W	3000K	82	E3
N	Philips	Incandescent	PAR20	50W	NA	100	E5
O	Sylvania	LED	LED	1W	NA	NA	E8
P	Philips	Metal Halide	T6	70W	3000K	82	E10

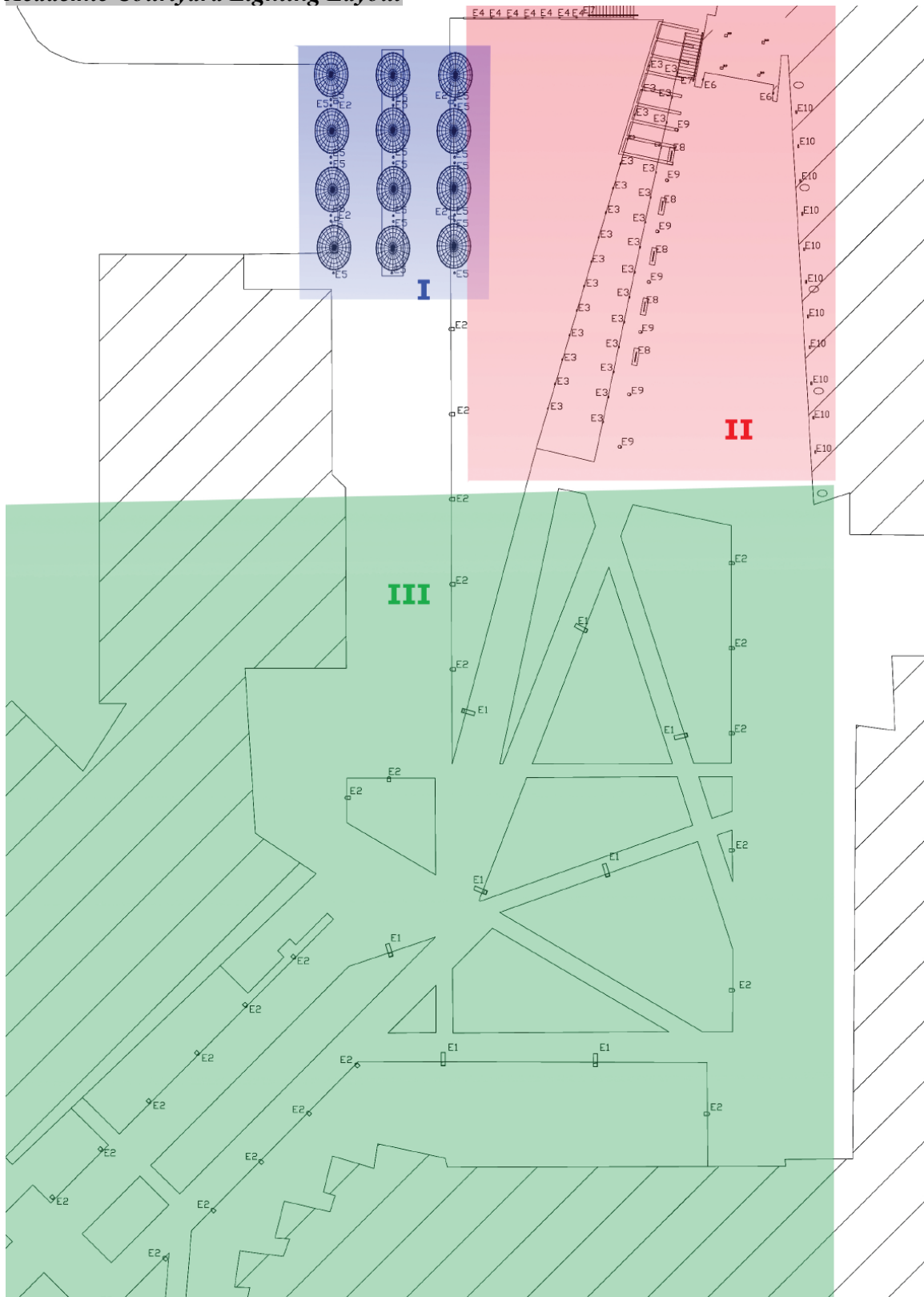
Light Loss Factors								
Type	Cleaning Interval	Category	BF	LLD	LDD	RSDD	LLF	Location
E1	12 Months (Medium)	V	1.00	1.00	0.78	0.94	0.73	Academic Courtyard
E2	12 Months (Medium)	V	1.00	0.76	0.78	0.94	0.56	Academic Courtyard
E3	12 Months (Medium)	V	0.92	0.85	0.78	0.94	0.57	Academic Courtyard
E4	12 Months (Medium)	V	0.98	0.83	0.78	0.94	0.60	Academic Courtyard
E5	12 Months (Medium)	II	1.00	1.00	0.86	0.94	0.81	Academic Courtyard
E6	12 Months (Medium)	V	0.98	0.95	0.78	0.94	0.68	Academic Courtyard
E7	12 Months (Medium)	V	0.88	0.95	0.78	0.94	0.61	Academic Courtyard
E8	12 Months (Medium)	V	1.00	1.00	0.78	0.94	0.73	Academic Courtyard
E9	12 Months (Medium)	V	1.00	0.85	0.78	0.94	0.62	Academic Courtyard
E10	12 Months (Clean)	V	1.00	0.79	0.88	0.94	0.65	Academic Courtyard

I assumed a 12 month cleaning interval for all fixtures since the building is located on the University campus. I also assumed a medium dirt level since these fixtures are exterior and prone to dirt and dust.

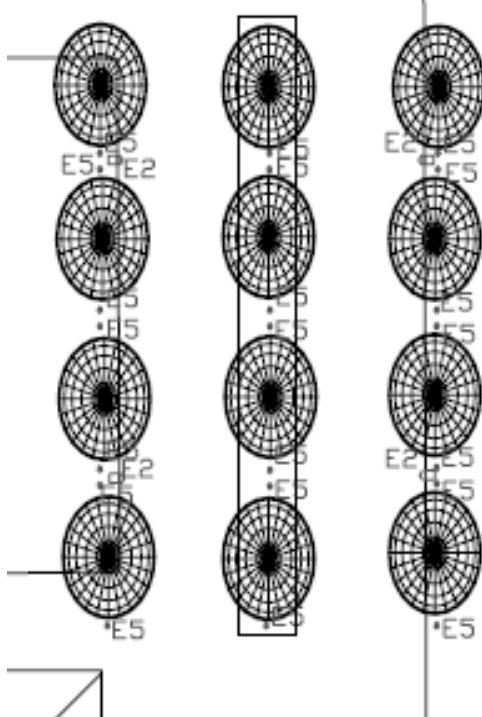
Power Density					
Fixtures	Fixture Count	Watts	Total watts	SF	W/SF
E1	8	135	1080		
E2	29	44	1276		
E3	29	14	406		
E4	7	24	168		
E5	21	50	1050		
E6	4	30	120		
E7	8	29.5	236		
E8	5	10	50		
E9	7	44	308		
E10	11	79	869		
			5563	61000	0.09

Using the input wattage from the specified ballasts and lamps, the power density came in under the maximum allowed of 0.2 W/SF which meets California Title 24 standards.

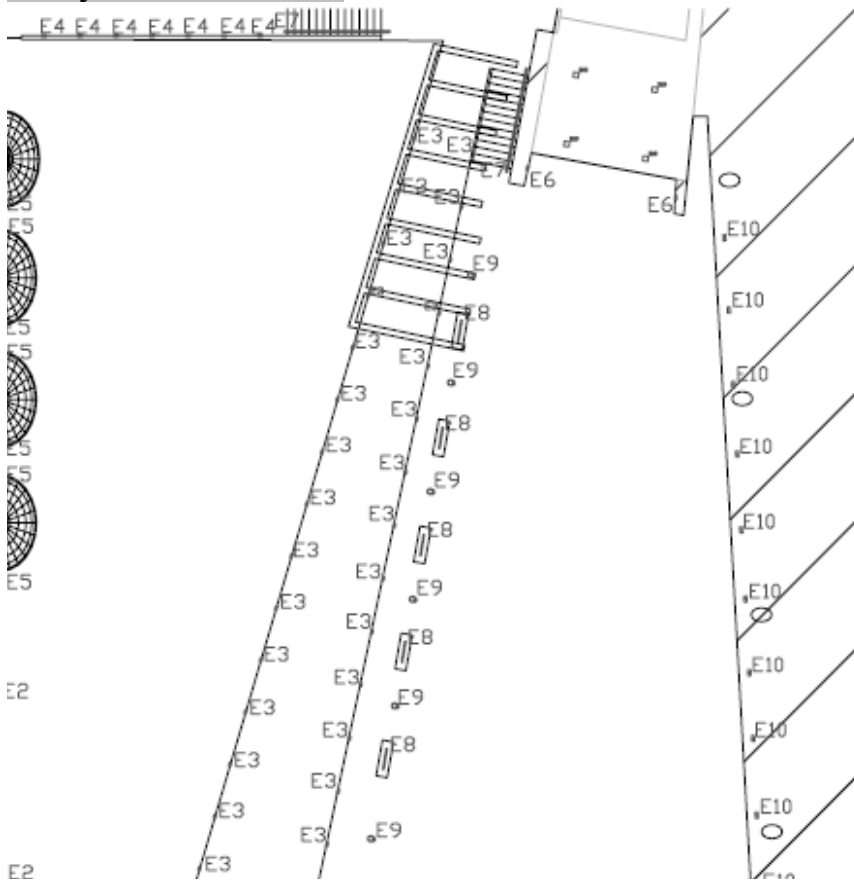
Academic Courtyard Lighting Layout



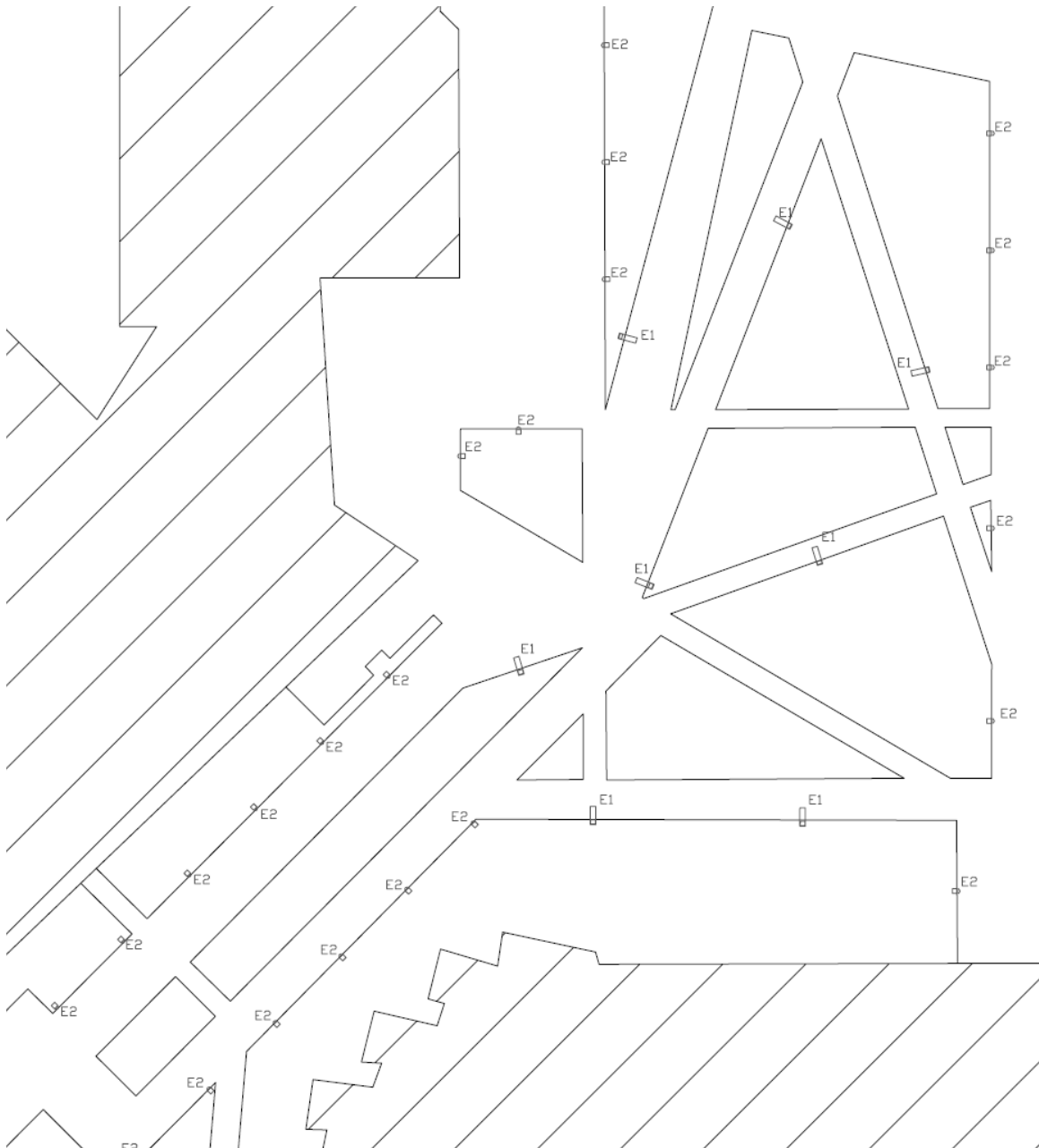
Tree Grove Fixtures and Entrance Fixtures - I



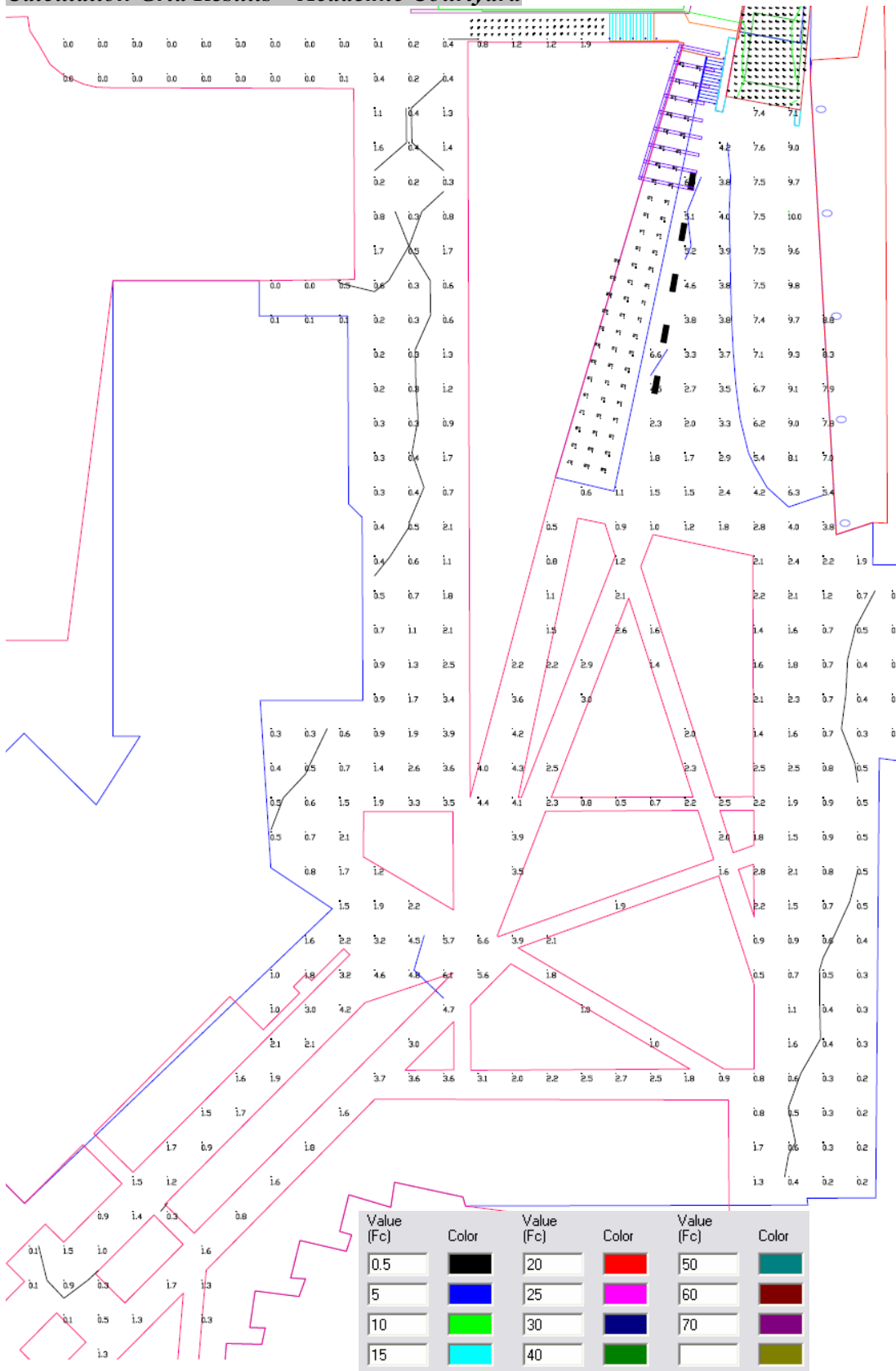
Courtyard Patio Area - II



East Side of Courtyard - III



Calculation Grid Results – Academic Courtyard



Calculation Results

Pathways Illuminance:	Avg: 2.10 fc Max: 11.2 fc Min: 0.0 fc
Ramp leading to Tunnel:	Avg: 1.59 fc Max: 2.4 fc Min: 0.8 fc
Walkway beside server room:	Avg: 1.2 fc Max: 5.3 fc Min: 0.6 fc

*Renderings for Academic Courtyard
Ramp Entrance to the Tunnel*



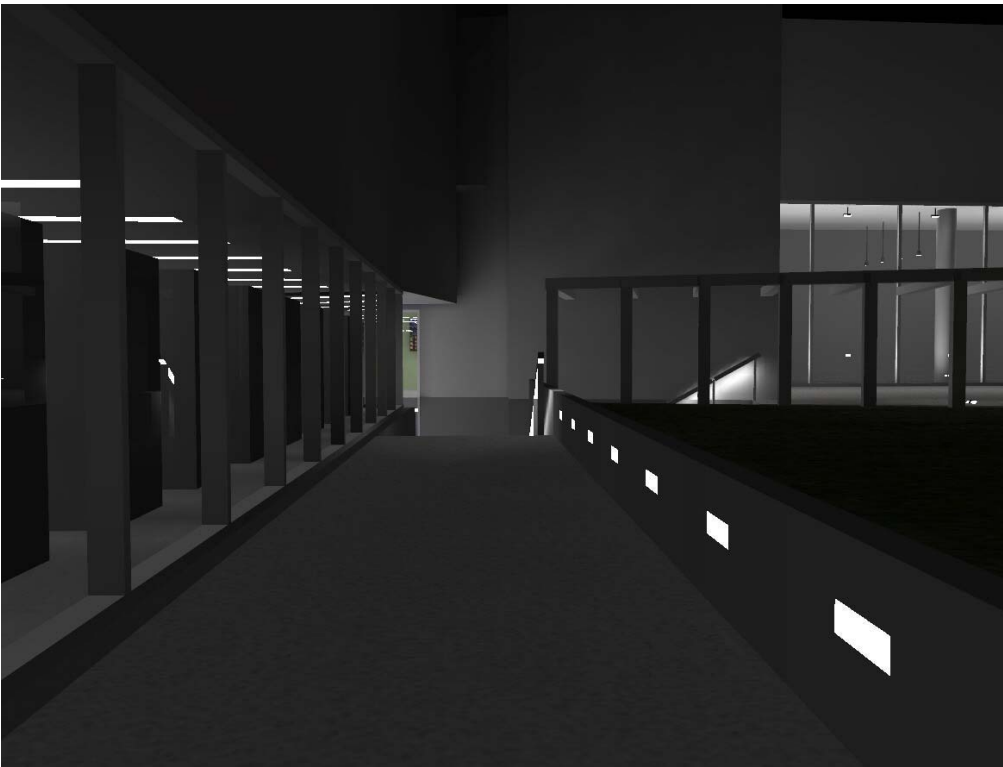
Stair Detail



Tree Grove Near Building



Walkway to Stairs



South East entrance to Academic Courtyard



Sky View Looking Down on Courtyard



Conclusions

The academic courtyard contains layers of light to focus on certain aspects. While the pole lights are used for general safety and circulation at night, the cooler color temperatures in the bollards and steplights lead you toward Cal IT². The steplights in the ramp lead you in a converging line to the underground tunnel through the building. The up-lights on the trees add some definition to the space for aesthetics and a nature feel to lean away from the technological feel. The under bench lights by the lobby entrance are used for accents as well as the small pathlights skimming the ground by the entrance. Overall, this space gives a nice blend of safety, function, and aesthetic lighting for the campus. The uplift for this area will hopefully draw more people to the space at night and result in even more expansion.