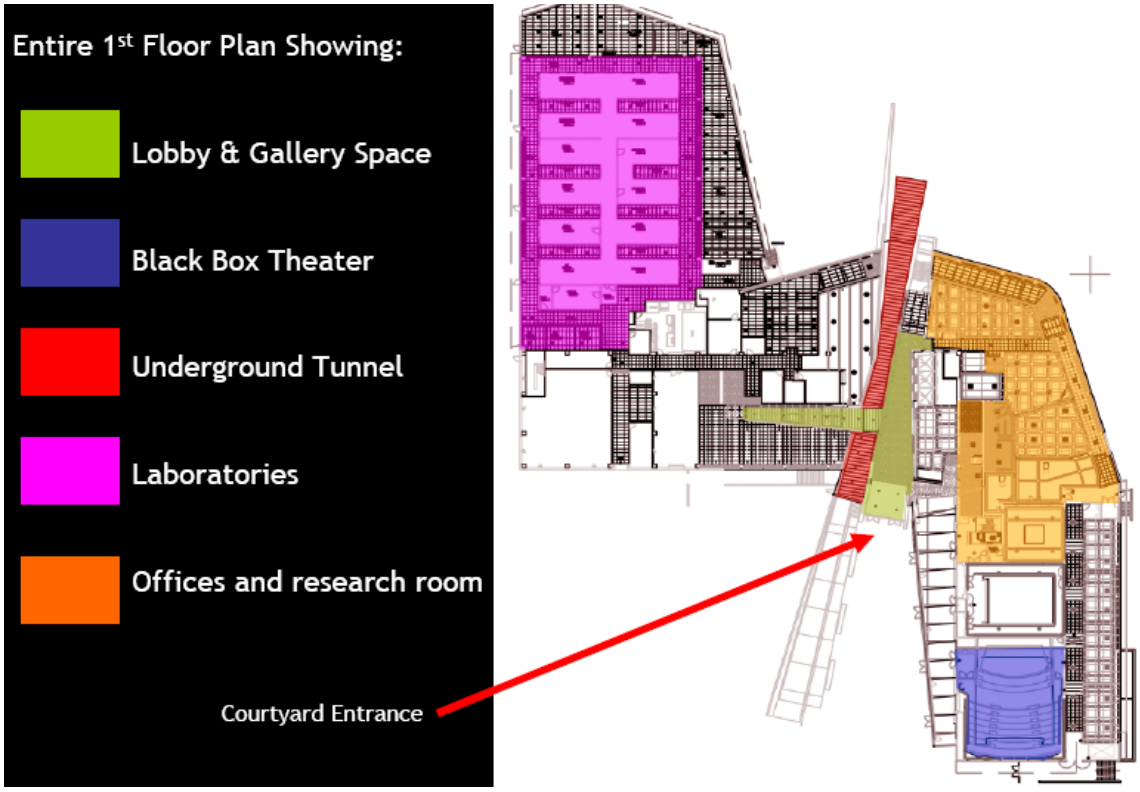
Underground Tunnel

The underground tunnel is located near the entrance to the main lobby from the academic courtyard. It runs beneath Cal IT^2 adjacent to the main lobby and out to the road on the other side of Cal IT^2. This tunnel has many unique characteristics to it. First, it is connected to the main lobby by half height clear glazing. A small bridge runs over the tunnel creating a divider between a two story ceiling and a single story space. The other side of the tunnel is a large concrete wall, leaving an area open to the imagination. The entrance to the tunnel is already redesigned in my academic courtyard section having multiple compact fluorescent steplights on the paths leading to it and under-rail fluorescent lights for the stairs. In this space, I intend to draw people to it by using light and innovation. A custom lighting display will be placed on the blank wall in the tunnel, and accent lights will be added through the foe windows on the other side. This combination will make an impressive technological statement for the building without ever being inside.



Design Criteria

Reflectances

Ground: 20% (Concrete pour slab)
Walls: 20% (Finished concrete walls)
Glass windows: 80% transmittance

Theme

The underground tunnel was constructed as an easy access path to get to the other side of Cal IT^2 without having to walk through the building. Since Cal IT^2 is about the fast movement of information and telecommunication, I decided to showcase this concept in an art piece of lighting. This tunnel will act as a fast information highway for people to have a sense of traveling through a computer server (the building's metaphor).

Horizontal Illuminance

In a circulation space, a horizontal illuminance of 5-10 fc is required for safety and pedestrian identification at night from IES standards.

Vertical Illuminance

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

Glare Considerations

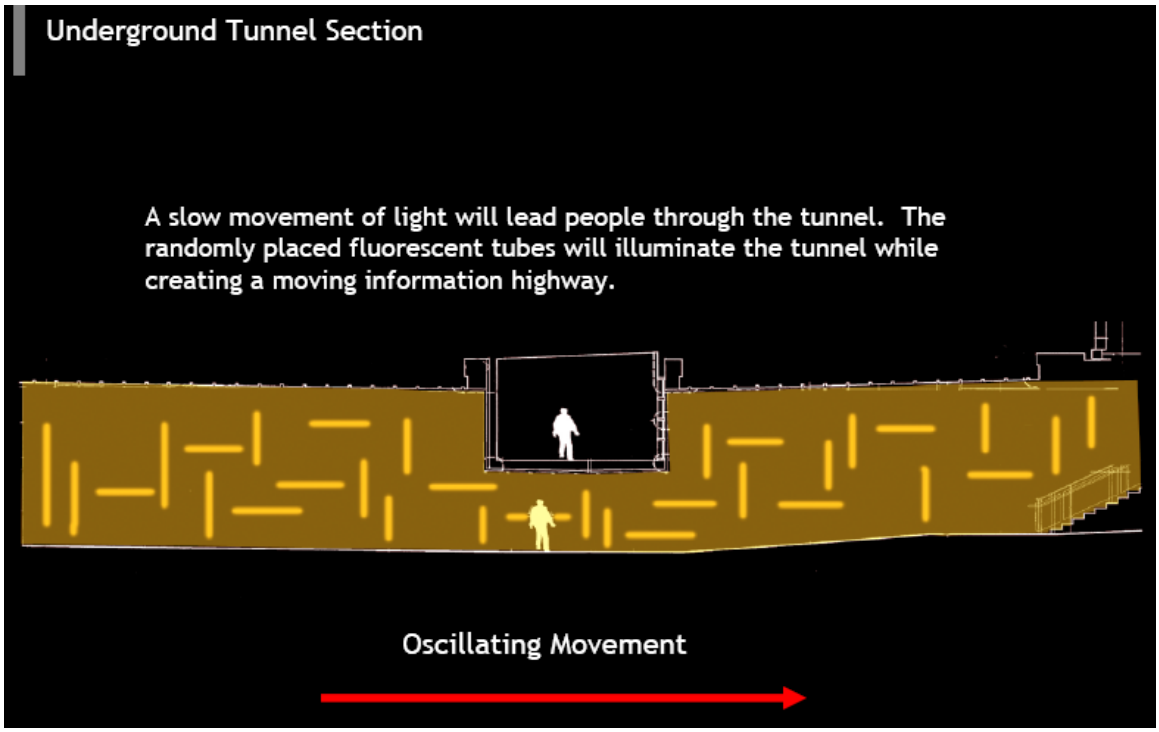
Glare could be a major issue with a large lighting display integrated into the entire wall of the tunnel. 60% transparent acrylic will be used to diffuse the light and make the light boxes less intense. The reflections from the corresponding windows on the other side of the tunnel will also be an issue.

Lamping Criteria

A uniform CCT of 4100K will be used in these areas with a CRI of about 82. This keeps in tune with the technological feel of the space. A color rendering index of 82 is going to be uniform throughout the whole building.

Power Density

According to California Title 24 Energy Standards, a circulation space power density should be < 0.5 W/SF.


Underground Tunnel Section
A slow movement of light will lead people through the tunnel. The randomly placed fluorescent tubes will illuminate the tunnel while creating a moving information highway.
Oscillating Movement

Light Fixture Schedule

Lighting Fixture Schedule
University of California, San Diego Cal IT2

Type		Mfr/Catalog #	Lamping	Notes
E11		**Zumtobel Staff Custom Fixture** Description: Large custom acrylic boxes with 32W T8 lamps with dimming. Various orientations and positions.	(#) 32W T8 FL lamp	Location: Underground Tunnel
E12		**Cooper Ltg - Metalux STN-132-*** Description: Surface-mounted fluorescent strip light, rigid housing with blue gelled 1-F32T8 (48in) lamp.	rigid housing 1-F32T8 (48in) lamp	Location: Underground Tunnel

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

Light Loss Factors

Type	Cleaning Interval	Category	BF	LLD	LDD	RSDD	LLF	Location
E11	12 Months (Medium)	V	0.88	0.95	0.82	0.9	0.62	Underground Tunnel
E12	12 Months (Clean)	VI	0.88	0.95	0.85	0.94	0.67	Underground Tunnel

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 for the lighting display since it is in an exterior space. The uplight in the tunnel is enclosed in a window and is not as prone to the dirt and dust.

Power Density

Fixtures	Fixture Count	Watts	Total watts	SF	W/SF
E11	X	X	X		
E12	24	29.5	708		
			708	1925	**0.37**

Using the input wattage from the specified ballasts and lamps, the power density came in under the maximum allowed of 0.5 W/SF which meets ASHRAE 90.1 standards. The lighting display box is considered a sculpture or "artwork of light". This is not counted in the power density calculation.

Fixture Relevant Schedules

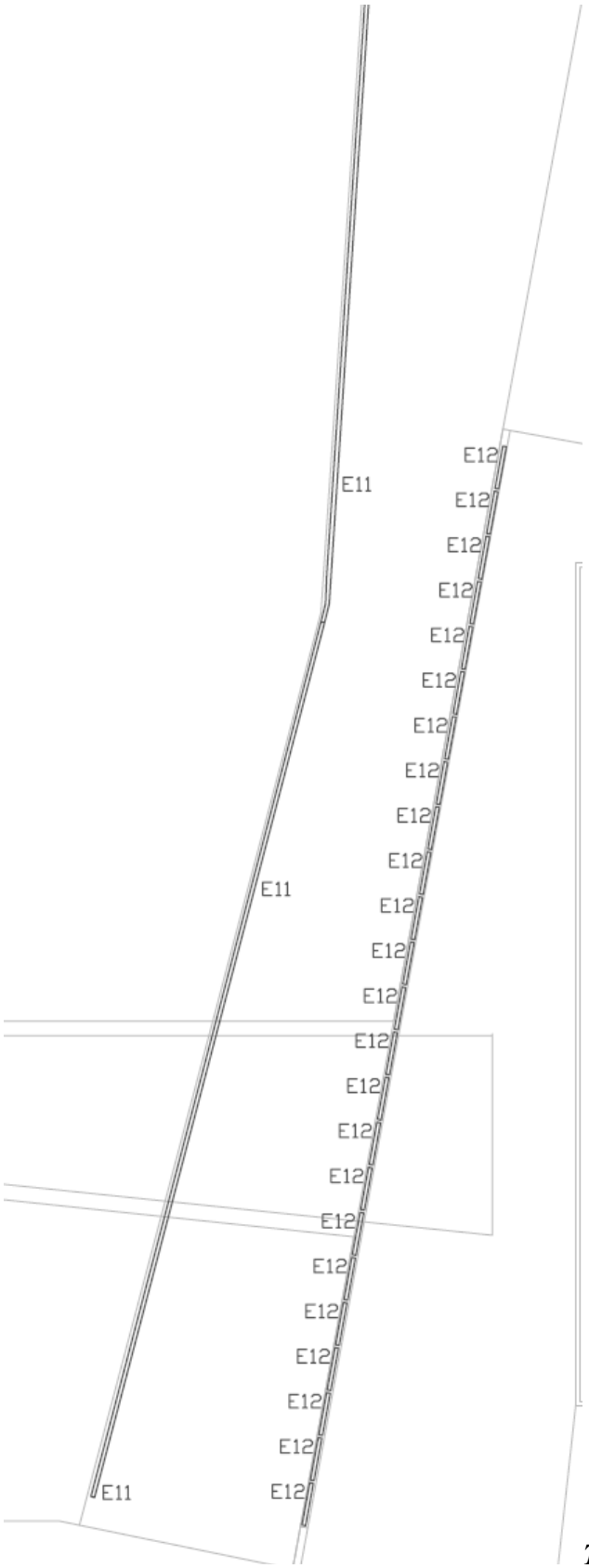
Ballast Schedule

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

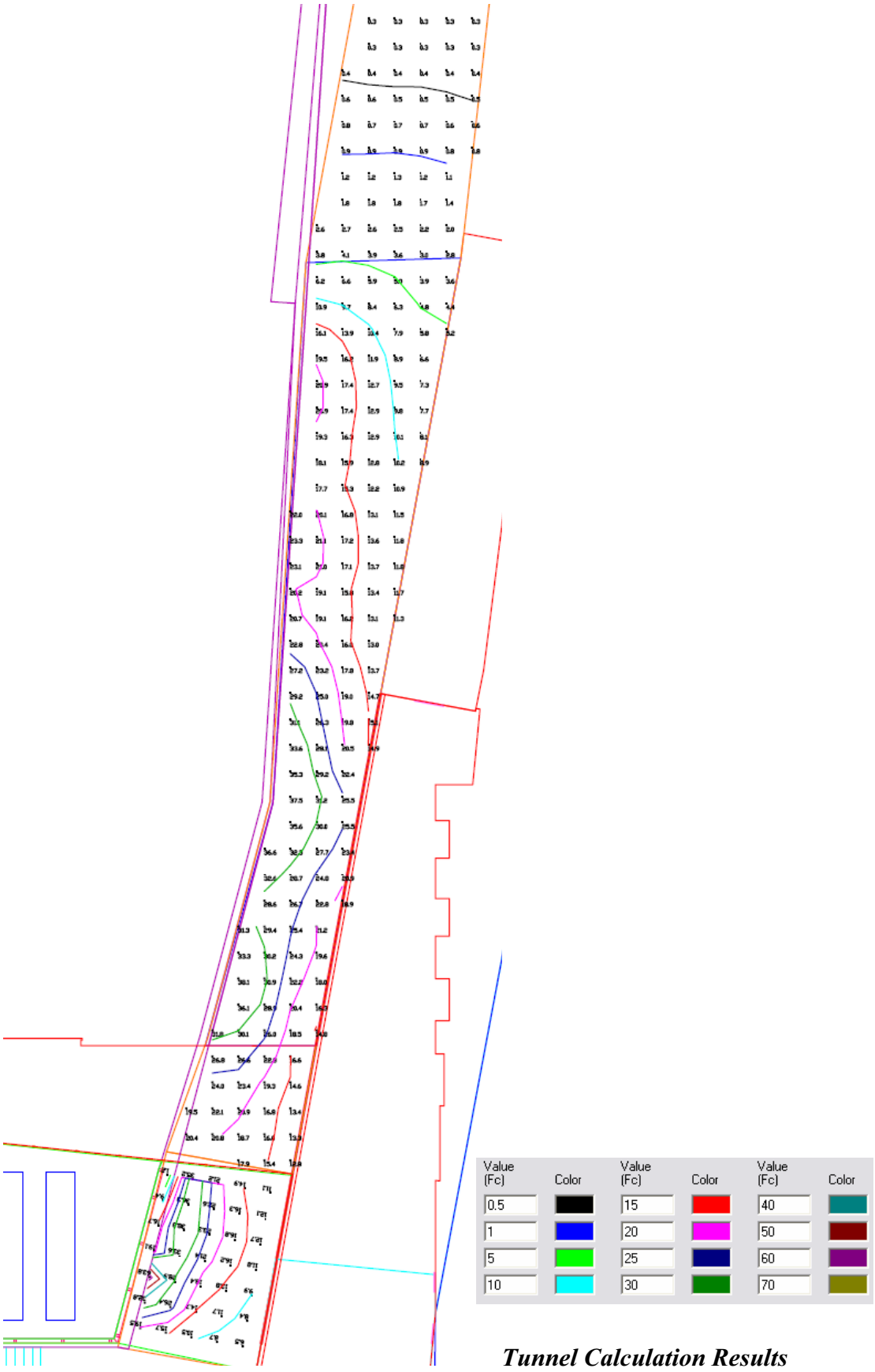
All ballast cut-sheets can be found in the appendix.

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



Tunnel Lighting Plan



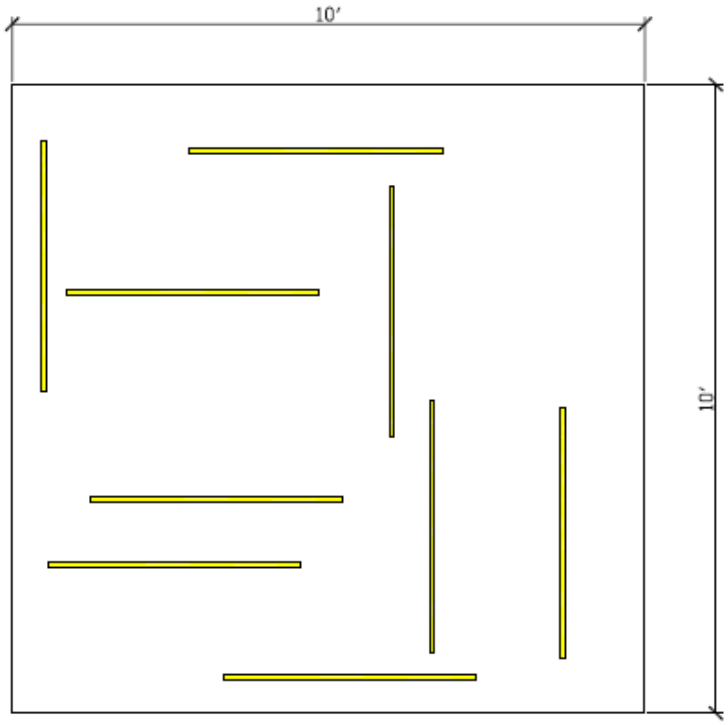
Tunnel Calculation Results

Calculation Results

Since this is a circulation space, only 5-10 fc is needed on the floor. Because of the decorative light piece, a lot of light is put on the floor.

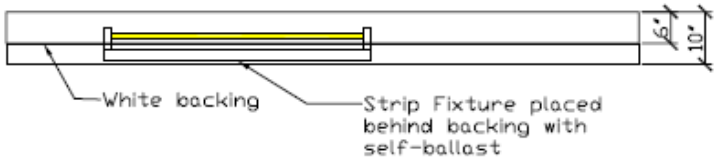
Avg: 16.5 fc
Max: 63.8 fc
Min: 1.2 fc

Fixture Details



Tunnel Wall Fixture E11

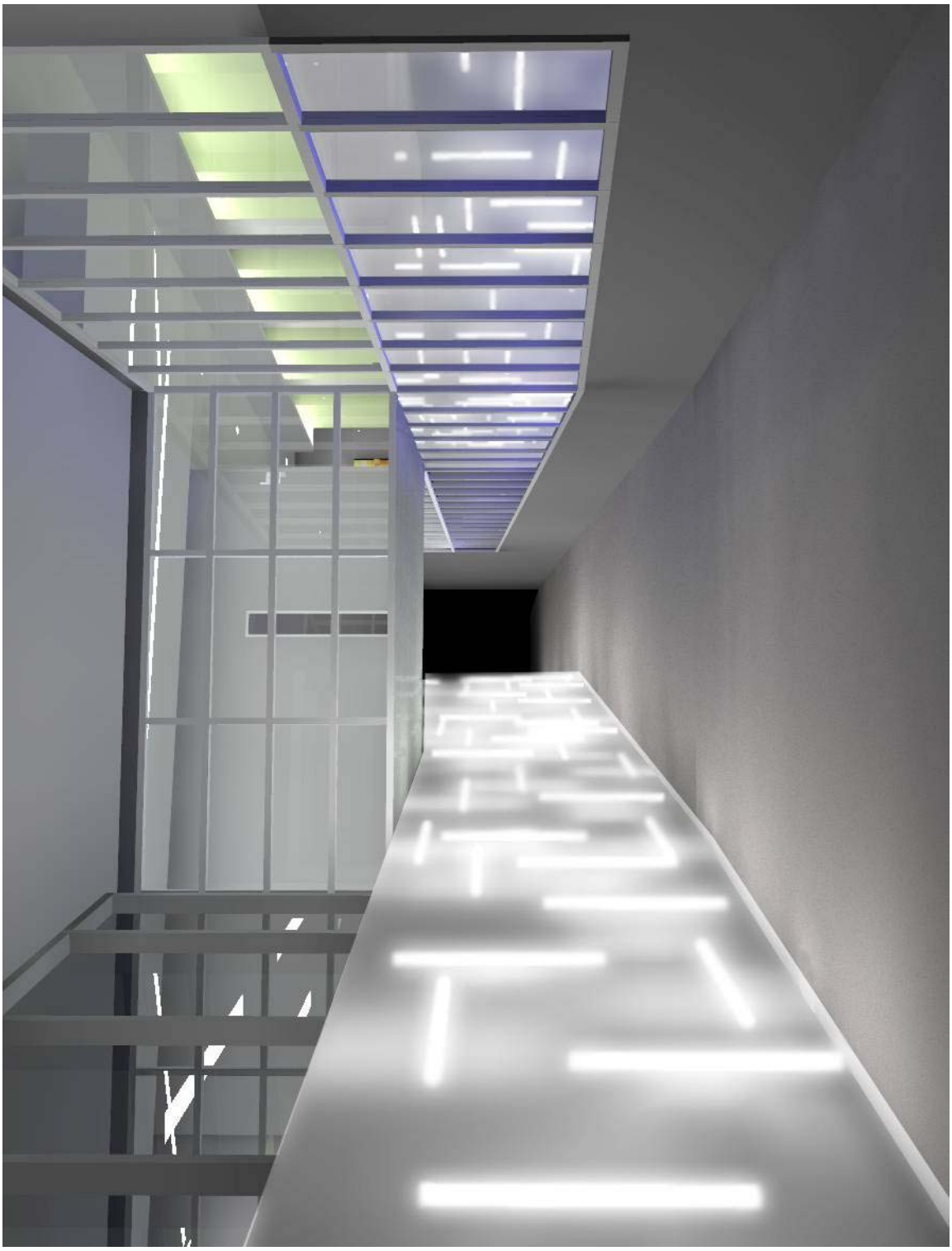
Randomly placed 32W T8 lamps
Fixture comes in custom sizes to fit tunnel walls
Suggested size is 10' x 10'
Ballasts placed in cavity behind fixture and tandem wired
¾" diffuse temperature treated acrylic with 60% transmittance
Panels can be re-lamped by taking front panel off with latch



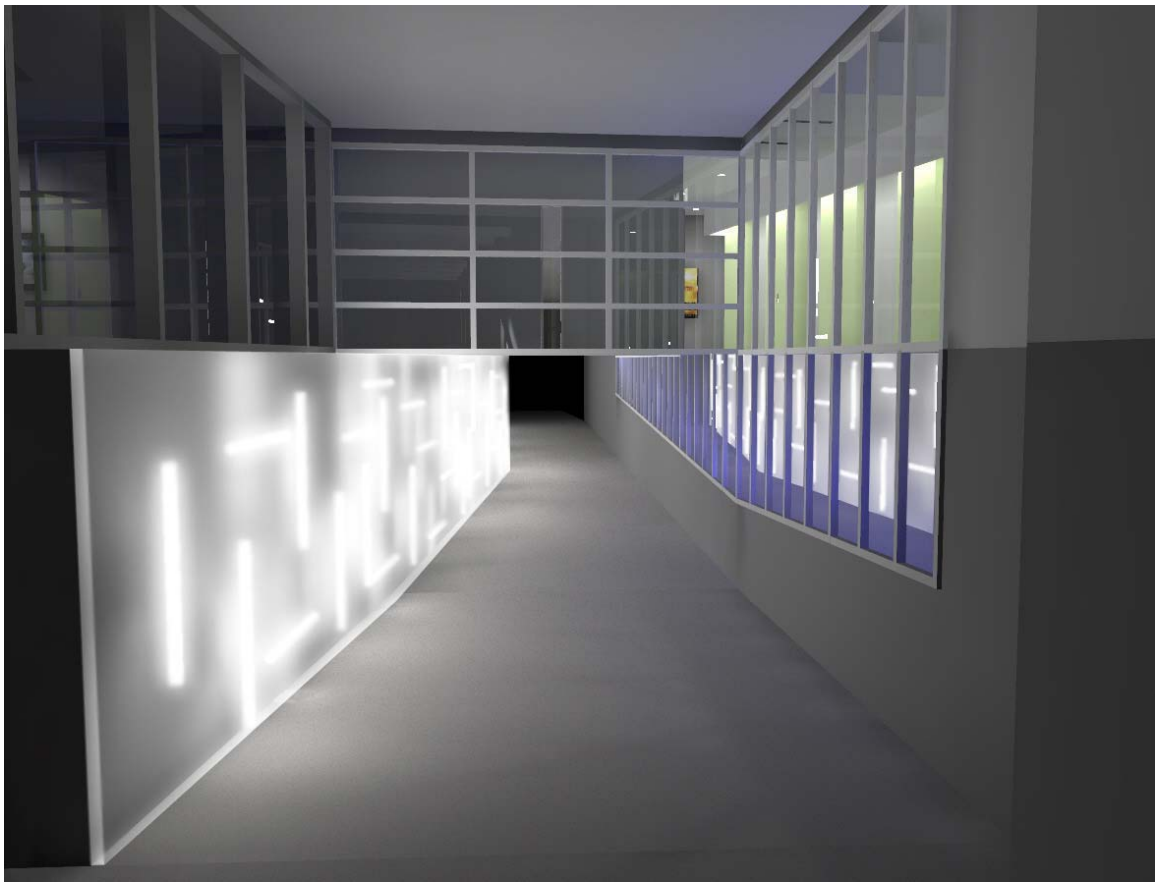
Renderings of Tunnel

West Side Entrance to Tunnel

Courtyard Entrance to Tunnel



Courtyard Entrance to Tunnel



Conclusions

The underground tunnel is definitely the main focus for all of the redesigns I made. It combines form with function to produce an intriguing display to guide people through. Because of the constant advancement in the telecommunications industry, I wanted to mimic this in the lighting design. Since this is, in a sense, the core of my building, its guts are shown and can leave an impact on the people using it.