Program Statement:

Guggenheim Museum, New York City

Myka Ahlemann, Mason Schmidt, and Maura Wilson

Introduction:

The Guggenheim Museum located in New York City is a masterful piece of architecture housing a large collection of highly valuable artwork. It was designed by renowned architect Frank Llyod Wright. When looking to redesign the facade of such an iconic part of New York City, the history of its design and creation is a fundamental part of the process. Part of Wright's vision was to have art and architecture become the same. Although the building originally received mixed reviews, The Guggenheim stands as an iconic part of New York City.

Site Information:

The Guggenheim building was built in 1959 and designed by Frank Llyod Wright. It underwent 2 major renovations, one in 1992, and one in 2005 when the adjoining tower was built directly behind the primary structure. The primary spiral structure is 92 feet tall. The building itself is primarily made from 7,000 cubic feet of concrete and 700 tons of steel. Sitting at the intersections of 5th Ave and 88th and 89th St., this deft piece of architecture remains as an ode to the innovations and stylings of Frank Lloyd Wright. The building faces northwest onto 5th Ave and Central Park, but it does have some portions that face onto 88th and 89th St. The building is not visible from the backside as it directly abuts the buildings behind it with no pedestrian access. The streets on which the Guggenheim sit are occupied by high quantities of pedestrians at all times of the day.

Location Considerations:

The Guggenheim building takes up the majority of the land that it sits upon, with the rest of the plot being taken up with public walkways. There are a few planter boxes that could be used to house some lighting instrumentation. To successfully design for this building, we must ensure that the majority of our lighting infrastructure sits within the building or on the facade preferably somewhere out of sight of the public. We must also consider the heavy foot traffic along 5th Ave and insure that the pedestrian walkways are lit for public safety. Additionally, the building sits directly across from a retaining wall that borders Central Park, so the distance that the building is visible from is relatively small. The museum itself is listed through several organizations as a historical site(NYC Landmark, US National Historic Landmark, US National Register of Historic Places, UNESCO World Heritage Site).

History:

Frank Lloyd Wright broke the expectations of the typical building with its round ribbon-shaped spiral. Normally buildings were rectangular, however, Wright wanted to create a contrast from the typical buildings in New York. Critics described it as a "beehive" and a "toilet bowl." Critics believed that this unique architecture would compete with the artwork on the inside. The building's rounded walls also made it harder to hang flat artwork on the walls. Through Wright's organic shape, he allowed his audience to create a new experience in viewing artwork and walking around this unique space. Wright wanted to allow the museum to free itself from the conservative restraints that had been placed on it, he felt as though his museum would make the Metropolitan "look like a Protestant barn." The location itself was selected due to its location on 5th Ave. This allowed for large volumes of foot traffic and pedestrians to see this unique structure. Additionally, another large factor is its proximity to Central Park. Wright designed this building inspired by natural forms, and this location allowed for the coexistence of the natural and the urban.

Design Concept:

Our concept comes from the initial charge given to Frank Llyod Wright by the curator Hilla Rebay. "*I want a temple of spirit, a monument!*"

Utilizing this concept we want to turn the front of the Guggenheim into a shifting stained glass window, using overlapping textures to create a dynamic and elegant lighting display. This display will primarily focus on the facade facing 5th Ave, but will also extend to the facades on 88th and 89th St. The tall structure behind the main facade will be utilized by shining bright beams of light over the main structure of the museum from the 4 horizontal windows in the large structure. These are intended to represent divine light.

Research and Development:

Guggenheim Museum, New York City

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General Comments:

Major uses of the Facility:

The Guggenheim is a world renowned art museum, housing an abundance of extraordinary works of art. This being said, there are multiple considerations that must be taken into account when looking to redesign the exterior facade through lighting.

Pedestrian Influence. New York City is a monumental city, accommodating over 8 million residents[1], with an addition of over 65.2 million tourists[2] yearly. This creates a densely populated area with high trafficked walkways. This must be taken into consideration when planning to light the facade of any building in this city. Due to this, the design will be as minimally invasive to the sidewalk spaces as possible. The design will attempt to keep all lighting fixtures out of the pedestrians field of view. Additionally, this design will illuminate the

[1] "Destination New York." *Center for an Urban Future (CUF)*, nycfuture.org/research/destination-new-york.

[2] IBID

facade and surrounding area in such a way that walking through this area at any time of night will be a safe experience. The design will aim at recognizing the need for a well lit exterior, while remaining elegant and satisfying to the eye.

Draw. The Guggenheim Museum's primary source of income comes from its ticket sales. The lighting of this facade will aim at drawing in the pedestrian's eye. The goal of the design is to add a certain "wow" factor to the facade and concept of the Guggenheim as a whole. This, in theory, will lead to a boost in attendance and ticket sales. By adding more interest to this facade, we aim at increasing the overall revenue of this site.

Environmental Factors. As this design will be implemented outside, there are many environmental factors that must be taken into consideration when looking to implement a new design on this facade. New York City faces an abundance of environmental conditions ranging from snow to heat. Due to this variety of conditions, the fixtures used must be able to withstand harsh weather conditions. To decrease the amount of maintenance and upkeep at this site, the fixtures used outside will be weatherproof and able to withstand typical New York City weather conditions.

Equipment Considerations. As mentioned previously, all equipment that is to be used in this installation will have to be rated for a variety of outdoor conditions. Additionally, any equipment that is used solely to facilitate safe access on public walkways will have to align with the standards set forth by the New York City Public Works Department, as they may be the ones doing maintenance on those particular items. Another consideration is that most of the lighting will be housed on the property itself, which means that any fixture selected must have a wide beam angle in order to cover the area required for a successful design.

Artistic Concept. The design was inspired by what would be a sacred space, such as churches. Many of the churches in New York City are very grand and have gorgeously decorated stained glass windows. The redesign of this building's facade would take major notes from this aesthetic as it would virtually transform the facade of the Guggenheim into a dynamic stained glass mural. Over the course of the night, the facade would be illuminated with vibrant colors, with specific emphasis on the levels of the rotunda and the two glass levels on the left side of the building. Additionally, using lights focused from the horizontal slats in the eight story building behind the main structure. Tight beams of light would descend onto the main structure, adding a transcendent and captivating visual narrative to the design. These sanctified beams of light act as visual draw, as their intensity and definition will aid in creating an encaptivating and enticing facade. This will create intrigue in the mission and meaning of the building itself.

Guggenheim History:

The Guggenheim Museum was founded by the Solomon R. Guggenheim Foundation. The foundation was created in 1937, with its first gallery in New York City opening in 1939. However, the origins of the idea date back even further. In the late 1920's, Solomon R. Guggenheim began to amass a very large collection of modern art. Having over 150 prized works, Guggenheim slowly began to show his collection to the public, often at smaller

exhibitions. It is from here that the partnership between Guggenheim and Hilla Rebay was formed. Rebay was an artist in her own right, but took a particular liking to the curation and display of artwork to the public. Rebay worked alongside Guggenheim to initiate the first loan exhibition known as the *Solomon R. Guggenheim Collection of Non-Objective Paintings*[3]. From here, the Guggenheim Foundation was founded with Guggenheim himself being elected the president of the foundation alongside Rebay who was appointed as trustee and curator. From here, Guggenheim worked with the foundation to begin opening art installations. The space chosen for the Solomon R. Guggenheim Foundation's initial exhibition was located at 24 East 54th Street and was named The Museum of Non-Objective Paintings. Organized by Rebay, this museum marks the first public display created by the Solomon R. Guggenheim Foundation in America.

From its inception, the Foundation had amassed numerous works of art. This growth led to a need for a larger dedicated space to house these works. In 1943, the Guggenheim Foundation charged Frank Lloyd Wright with designing a permanent structure to house the expanding collection. Over a 16 year period, Wright would go on to design this now iconic structure having created over 700 sketches and 6 independent designs for the building[4]. After selecting a plot of land located between East 88th and 89th Streets on Fifth Avenue, construction would begin in 1956. Unfortunately, both Guggenheim and Wright would pass away prior to the permanent museum's completion, in 1949 and 1959 respectively. In October of 1959 the Guggenheim Museum would open to very mixed reviews. During the intermittent years, while the primary structure was being built, the Guggenheim Foundation continued to present showcases and installations in smaller venues, primarily focused in New York City.

When the Guggenheim opened, the architecture received many mixed reviews, some praising the architect, and others destroying the design. Some of the most notable negative comments include calling the building a "beehive[5]" and "a toilet bowl[6]." Other more positive comments include calling the architecture "the most beautiful building in America[7]." These quotes demonstrate the polarity caused by Wright's architectural style and the finished product. This being said, over the 60 year period since its opening, many of the negative comments about the building's design have died down. The building is now seen as a staple of New York City and has been nominated for numerous notable accolades including a UNESCO World Heritage List nomination and its designation as a National Historic Landmark[8].

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[3] "Guggenheim Architecture Timeline." *The Guggenheim Museums and Foundation*, www.guggenheim.org/history/architecture.

[4] IBID

[5] The Editors of Encyclopaedia Britannica. "Guggenheim Museum." *Encyclopædia Britannica*, Encyclopædia Britannica, Inc., 9 Dec. 2019, www.britannica.com/topic/Guggenheim-Museum-art-museum-New-York-City.

[6] IBID

[7] The Editors of Encyclopaedia Britannica. "Guggenheim Museum." *Encyclopædia Britannica*, Encyclopædia Britannica, Inc., 9 Dec. 2019, www.britannica.com/topic/Guggenheim-Museum-art-museum-New-York-City.

[8] "Solomon R. Guggenheim Foundation Timeline." *The Guggenheim Museums and Foundation*, www.guggenheim.org/history/foundation.

The Solomon R. Guggenheim Foundation has continued to be active, creating new museum branches internationally. One of the most notable structures erected is the Guggenheim Museum in Bilbao. This structure, designed by Frank Gehry, demonstrates the Foundation's commitment to pioneering and innovating in the world of design and implementation. These morals will be conveyed through the redesign of the exterior lighting systems at the New York location. The design will push the boundaries of modern technology and create a visually stunning narrative transforming the masterful architecture of Wright.

Over time, there has been some restoration and additions made to the Guggenheim Museum. The first major restoration project began in 1990 and was completed in 1992. This major renovation added the large eight story structure that now sits behind Wright's original structure. This building was added to provide more gallery space as well as storage and office space. The addition created an additional 51,000 square feet of gallery space and over 1,400 square feet of office space[9]. Additionally, the restaurant, and original gallery reopened to much praise. During this time, the primary exhibits of the museum travelled across the world on an international tour. The next time the museum would receive a renovation is in 2005. During this renovation, the Wright portion of the building was restored and many of the cracks and corroding steel were treated and repaired. This renovation was completed in 2008 and included the addition of site-specific projectors which would be used to illuminate the structure at night. In 2009, the Guggenheim celebrated its 50th Anniversary and continues to wow and amaze patrons to this day.

Frank Lloyd Wright:

Wright was born in 1867 and died in 1959. He designed over 1000 structures in his 70 years of work within the architectural design field[10]. Wright would be a foundational thinker for a movement known as "Organic Architecture[11]" which believed that architecture should draw influence from the natural world, and that architecture could serve to blur the boundaries between the building and the space around it. Additionally it believed that a building is an organic whole, and any choice made in the design of a building should support that whole. Wright was famous for his usage of glass windows to do exactly this, he viewed glass as similar to "the mirrors of nature" such as lakes, rivers, and streams.

Wright's views on architecture and nature make the placement of the Guggenheim directly across from Central Park seem an obvious fit. Although Wright did not live to see the museum opened in 1959, he did live long enough to oversee the vast majority of the project. The design of the building was one of his later works, and while it had natural influences as a part of the design, the building forgoes Wright's earlier aesthetic focusing on windows. Instead it focuses on the other design element that made Wright famous, concrete. The structure is made entirely out of concrete, except for the windows that sit atop the two large chambers on either side of the structure.

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[9] IBID

[10] *Frank Lloyd Wright Foundation*, 2 Sept. 2020, franklloydwright.org/.

[11] IBID

Art Housed at the Guggenheim:

The Guggenheim mainly displays modern and contemporary art, which is not what is usually expected when an audience walks into an art museum. The unique architectural structure helps bring the modern art on the interior to its exterior. The plain white exterior is a vast contrast from the bright and colorful artwork on display in the inside. When the viewers walk into the space they are left in awe of the magical world created inside the extremely tall cylindrical atrium.

The Guggenheim also houses exhibits in the extension, such as post-impressionistic art. This allows the viewers to come see what they would usually expect to see in the space of the museum. The pieces that can come into the exhibits showcase more historical artwork, which provides a wide variety of artwork shown. The diversity in artwork creates a wider audience for the museum, increasing the amount of tourists that come to tour the museum.

General Equipment Information:

The equipment used in this installation will allow for the Guggenheim to be a distinct symbol of New York City, both at night and during the day. For the lighting of the crevices of the rotunda, LED color changing strip lights will be used. Throughout the installation, there will be wash lights, illuminating the facade, adding depth and dimensionality to the structure. Additionally, color changing sources will also be included on the left side of the structure in the visible windows, as well as the middle section of the structure to allow for further dynamic control of the facade. Lastly, compact moving lights with a tight beam angle and powerful source will be placed in the four vertical slats on the far structure. This will allow for the divine light motif that will descend upon the primary structure. All equipment housed on the exterior will be weatherproof and able to withstand the climate of New York City, remaining fully operational year round.

Inspiration:

Non-objective Painting. The Guggenheim houses many different types of artwork, and one type is called Non-objective Painting. It is an abstract mixture of colors and shapes. We intend to create light from Guggenheim that is a mixture of colors and utilize gobos to create abstract shapes. Through taking inspiration from this type of artwork, we are breaking the bounds of what is to be expected, much like Wright did when he designed this building, while simultaneously respecting the architecture he created.

Stained Glass Windows. The curator of the Guggenheim, Hilla Rebay, said "*I want a temple of spirit, a monument*[12]*,"* when talking about what her goal for the Guggenheim was. We wanted to respect her wishes and aide in making the museum a sacred space. The idea that sparked out of this quote, was to make the building a stained glass window. We intend to have dynamically textured light bleeding from the indents in the building. The light will be leaking along the ribbon like pathway that makes up the unique structure of the Guggenheim. The extension's square like indents will also be lit up, to aid in the texture. The four horizontal slats

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[12] "The Solomon R. Guggenheim Museum." *The Art Story*, www.theartstory.org/museum-guggenheim.htm.

in the extension will have lights placed in them to shine the beams down on to the Guggenheim. These beams will represent the light of a higher being or the sun, that is then effectively reflected in a new way.

Inspirational Images:

Final Schematic:

Guggenheim Museum, New York City

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System Considerations:

Who uses the space?

The space is used by two key groups: pedestrians and patrons. Not only will the lighting of this building be practical by illuminating the surrounding streets, it will also act as a visual draw. The goal of the design will be to draw attention to the building, accentuating its unique architecture and creating intrigue with pedestrians. The goal of this will be to gain attention, thus drawing in more patrons to the museum, increasing revenue.

How critical is the task being performed?

Not only will the re-lighting of the facade of the Guggenheim add interest to the building, it will also act to light the surrounding area. Since New York City is known as the “city that never sleeps” and has very active nightlife, it is important to look into how this building can make a statement in such a crowded and dense area. This

design will allow for the site to gain additional attention at night, where previously it was receiving very little. Throughout the daytime, the museum stands as an iconic piece of architecture within the city; through our design, we would like to extend that principle to standing as an iconic piece of architecture *all* day and night.

Where is the visual task located?

The lighting of this building will aim at accentuating both the architecture and the space itself. The lighting of this building will put special emphasis on lighting the name of Guggenheim. This will be done by having the name be lit brighter than its surrounding area, drawing in the eye. This will allow to casual onlookers the ability to quickly identify the building, and leave a lasting impression. Additionally, this design will pay special attention to how the architecture itself is lit. The goal is to add dimensionality and depth to the structure while respecting its artistic integrity and original design.

What is the proper quality and quantity of light for the task?

Our goal is to artfully light the facade of this building. We need to provide enough light so that the building itself is well lit, and there is ample ambient light to provide pedestrians with a safe walking experience. However, the existence of too much light will cause the facade to appear flat and unappealing to the eye. Our goal is to provide elegant lighting for the building and provide enough ambient light to ensure that pedestrians remain safe when near the building.

Will the space be a pleasant place for users to enter and in which to spend time?

Yes, the goal of this design will be to add intrigue to the building itself. The design will add visual draw to the building, which is intended to draw more pedestrians inside to investigate and see what the building has to offer. The primary goal of this is to boost attendance and revenue.

Will the lighting system be compatible with the architecture?

The lighting of this structure will cause no significant changes to the architecture. The only changes being made will be the inlaying of lights within the concrete, allowing for the fixtures to uplight the facade. No key structural or visual changes will be made.

Will the lighting system work with available daylight? Will it work at night?

The lighting system will be able to operate at all times of day, however in order to save energy and remain efficient, the primary goal of this design will be to effectively

light this structure at night. The design will also provide sufficient ambient light to add safety and visibility to the surrounding area.

What color of light is appropriate?

We plan on using LED lights that will be capable of a wide variety of colors. We plan on using a variation of colors to represent the colorful art that is housed on the inside of the museum.

Will glare be a problem?

It will not be a problem, due to the material of the building. The Guggenheim is made of concrete, which is non-reflective. Through the placement of our lights, they won't blind people walking by.

Is the lighting system using energy and resources responsibly?

We are using energy efficient lights, through our selection of LEDs versus incandescent. If we had chosen incandescent lights, we would end up using more energy.

Is the lighting system flexible?

Yes, LED fixtures are versatile in their range of applications, such as color and intensity. The LED doesn't need anything added to it, to change color or intensity, because those functions were built into the fixture.

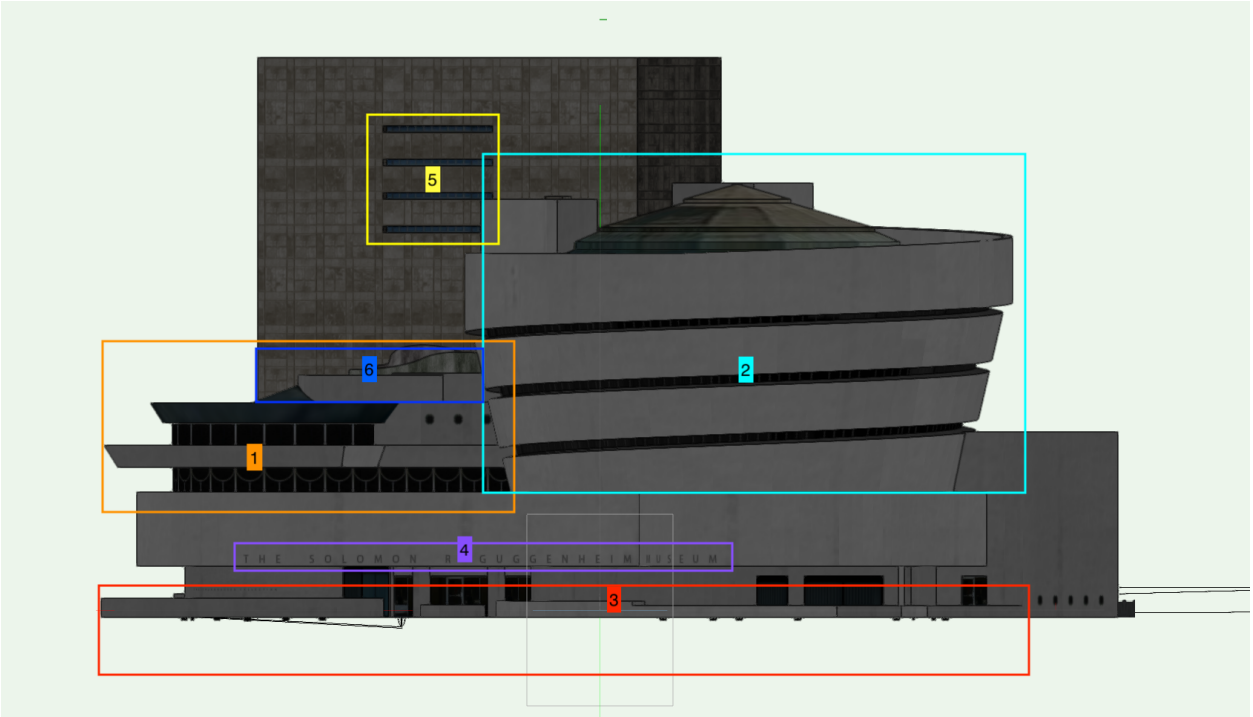
How will the lighting system be controlled?

We will be using the Mosaic system to control our lighting set up. It will allow us to control and schedule our lights, so we don't need a console. It will also allow us the flexibility to combine our projects and schedule off-line.

What are the lighting considerations particular to the area?

One of the most important considerations is making sure there is enough light for pedestrians to see. We want to make sure that visitors feel comfortable walking around the building. This goal will help the museum attract future visitors and tourists.

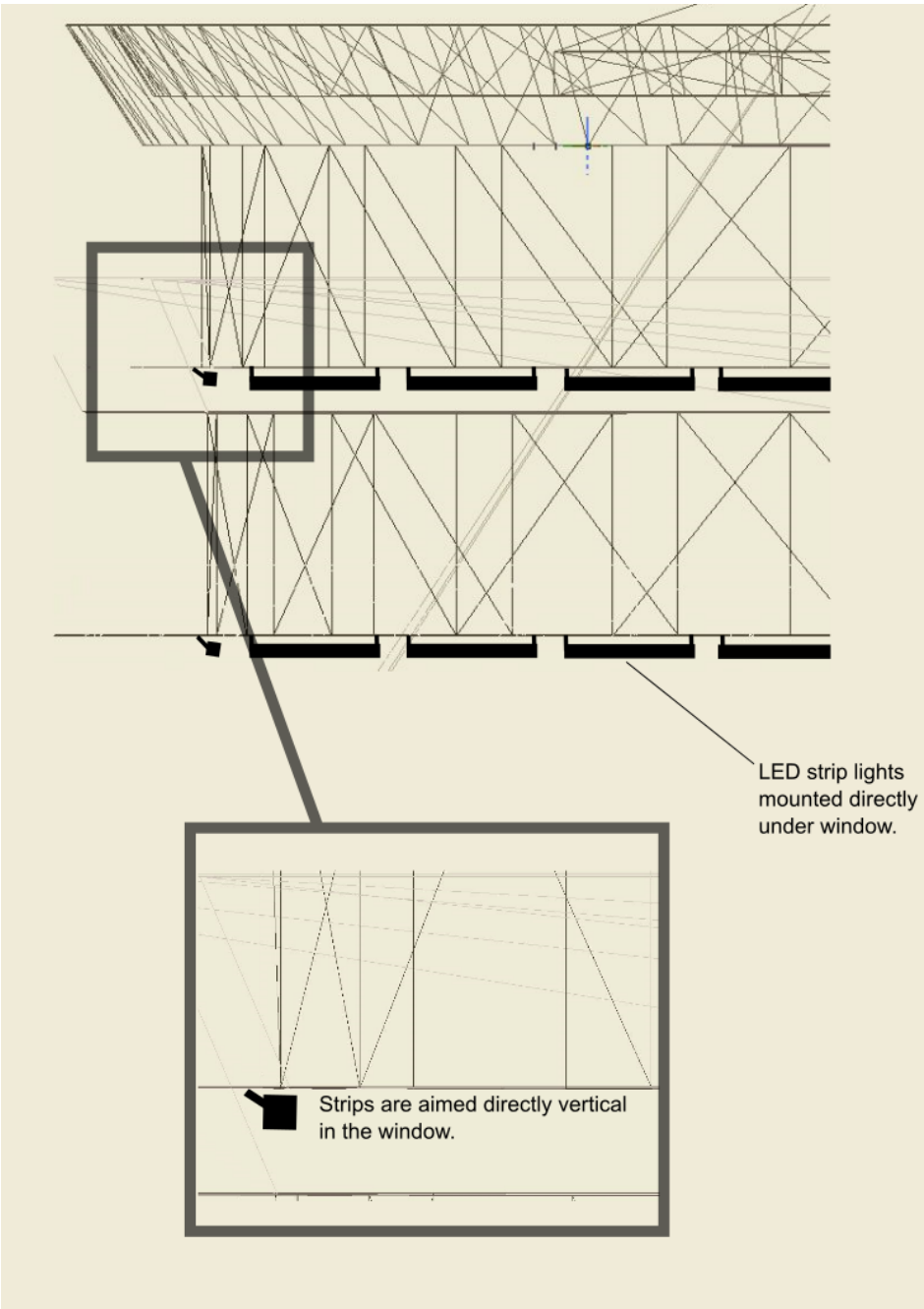
Main Systems:



Main Systems Used:

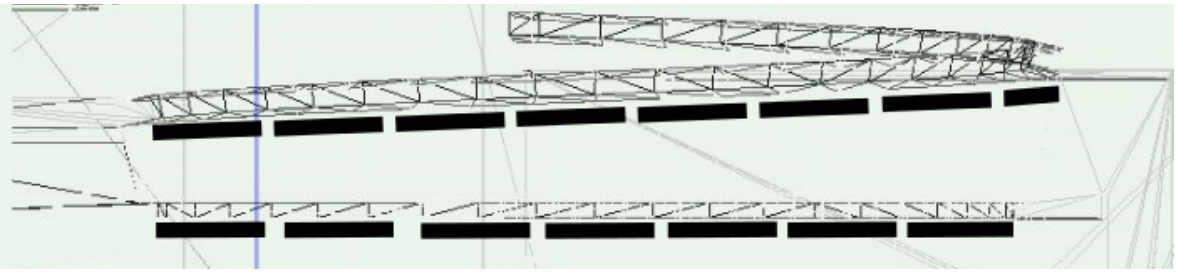
1) **LED Strip Lights - Left Windows**
2) **LED Strip Lights - Right Rotunda**
3) **Inlaid Ground Wash Lights**
4) **Nameplate Lights**
5) **Window Slat LED**
6) **Scrapes**

1) **LED Strip Lights - Left Windows**



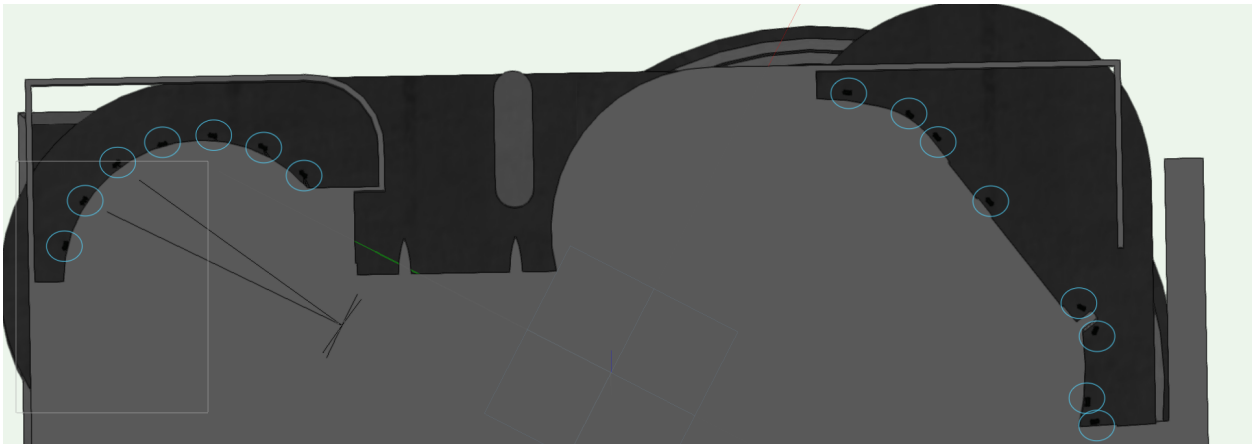
The windows will have LED strip lights mounted directly below them around the entire circle on both levels. These lights will be focused vertically to create a lantern effect all around the building.

2) **LED Strip Lights - Right Rotunda**

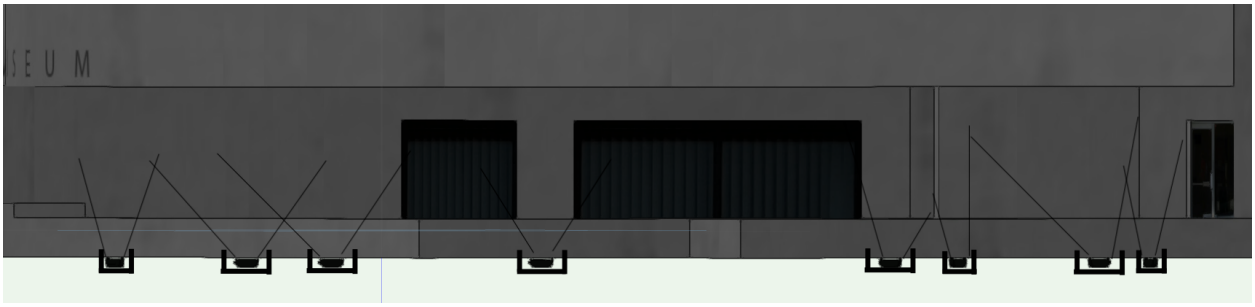


The lighting for the spirals will be internally mounted directly beneath the windows facing upwards towards the outside.

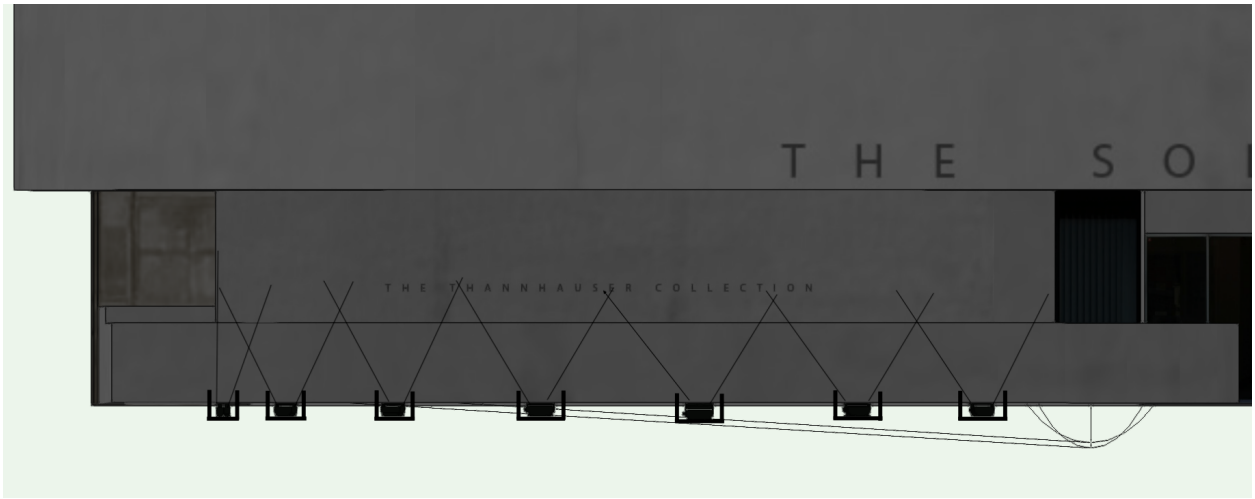
3) **Inlaid Ground Wash Lights**



Each blue circle denotes a light which is inlaid into the concrete.

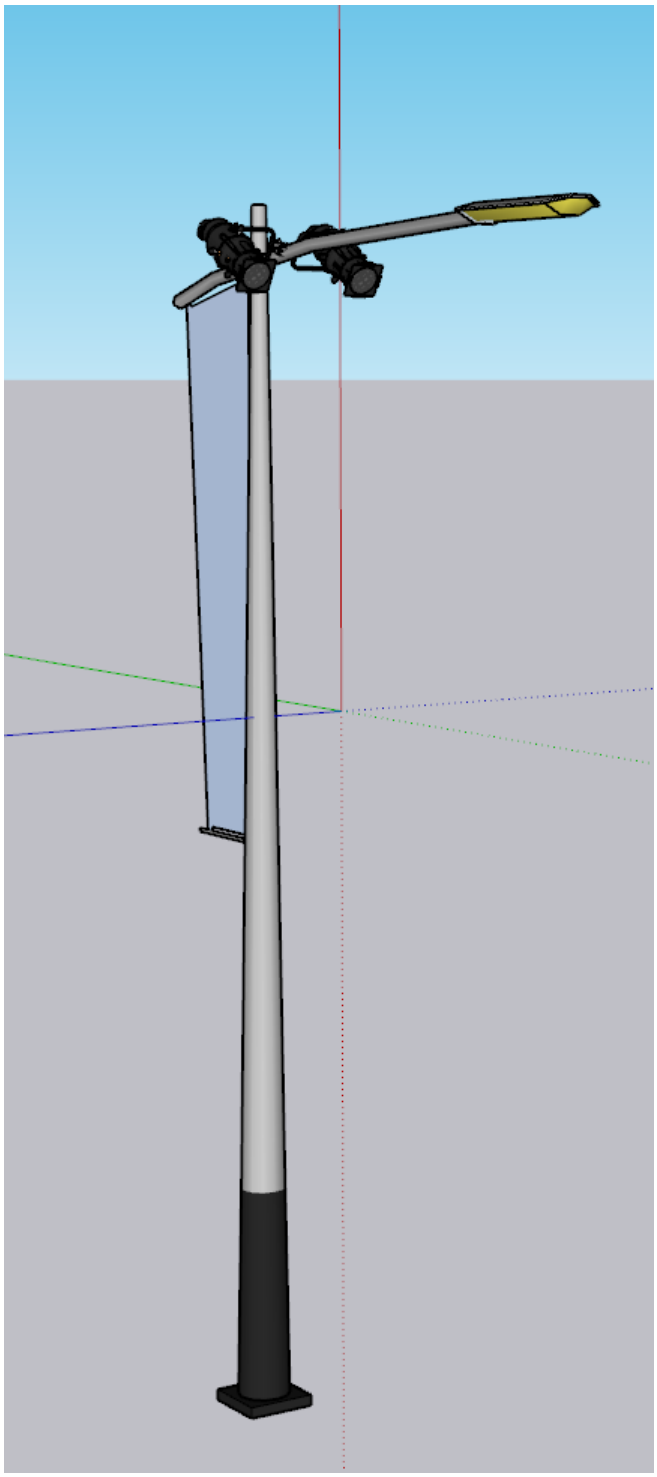


Detail of the right side of the structure and lights that will be inlaid.



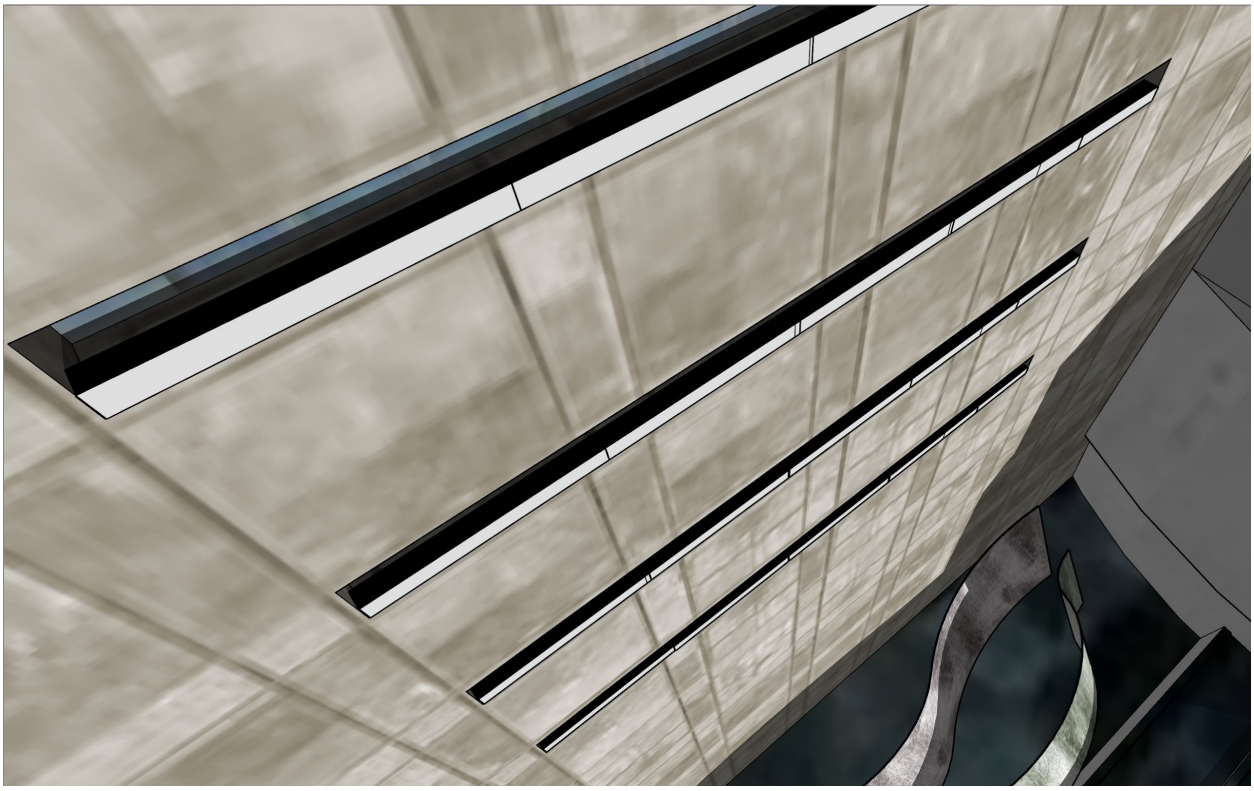
Detail of the left side of the structure and the lights that will be inlaid.

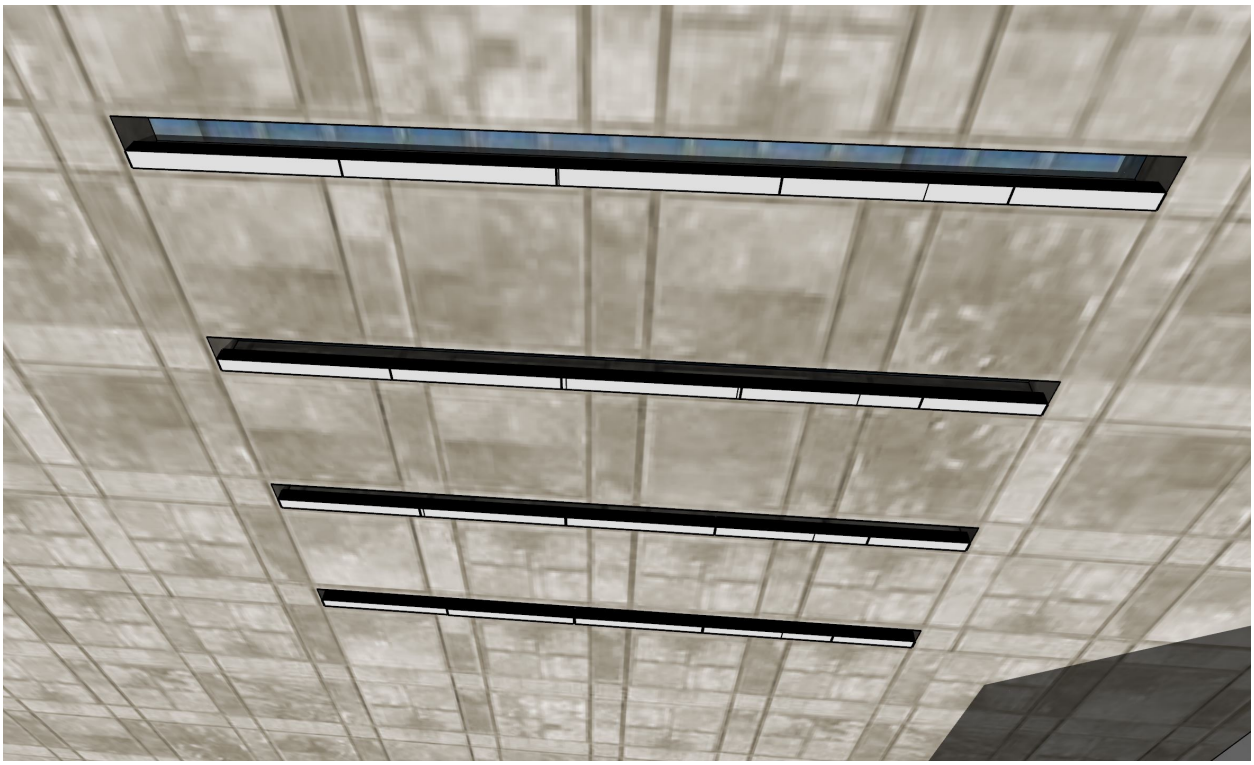
4) **Nameplate Lights**

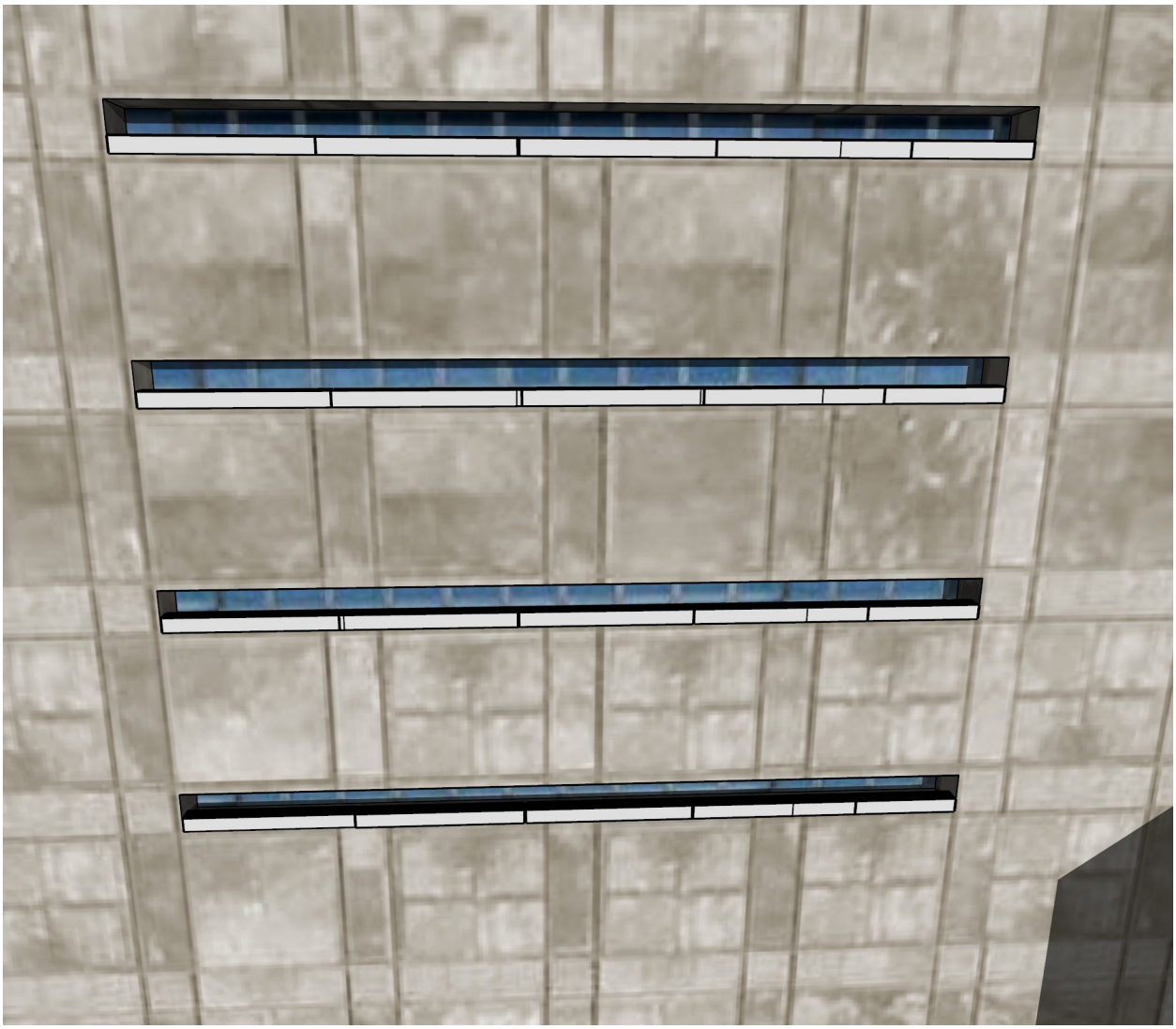


The street lamp is situated directly across from the street from the nameplate of the Guggenheim, and two sources will be used to add additional light to the nameplate.

5) Window Slat LED

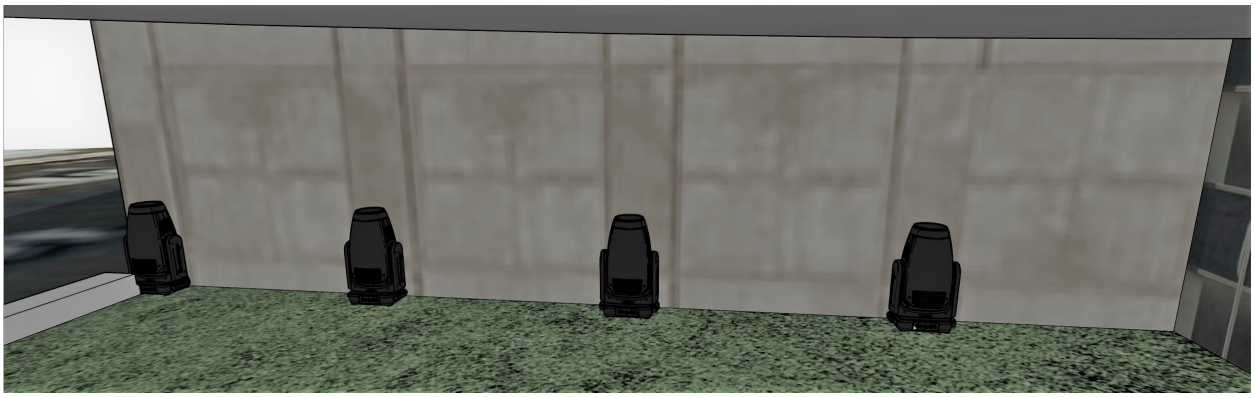


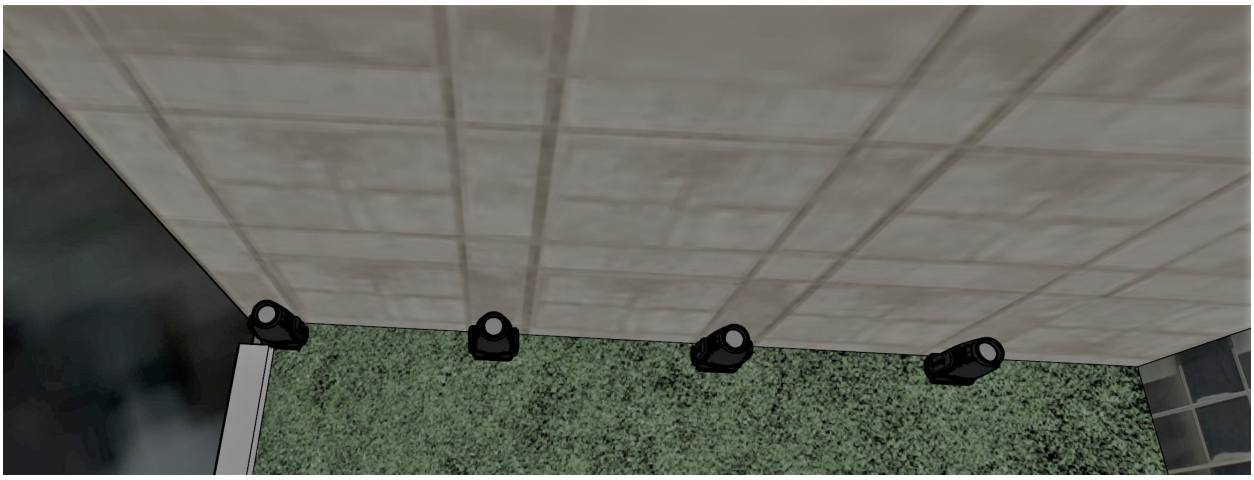




We plan on using smaller strip lights, and they would be focused up more.

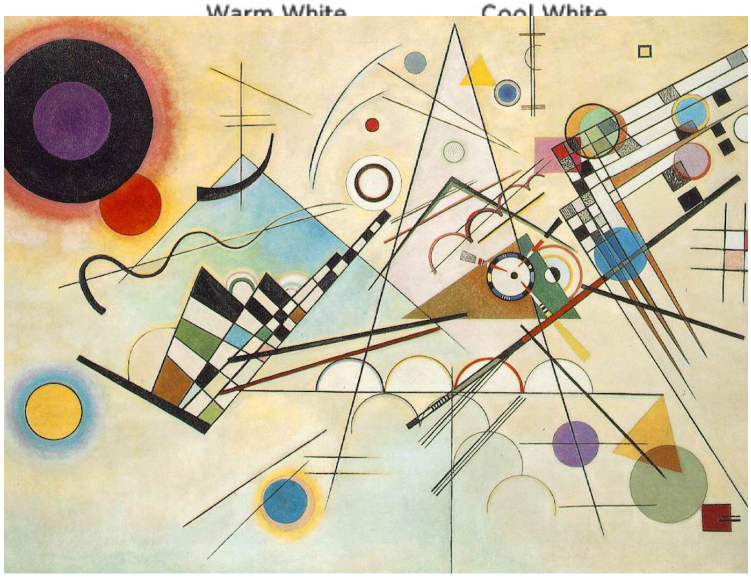
6) Scrapes





We would be using different lights and will explore the possibility of embedding them into the ground..

Color Pallets:



Design Development:

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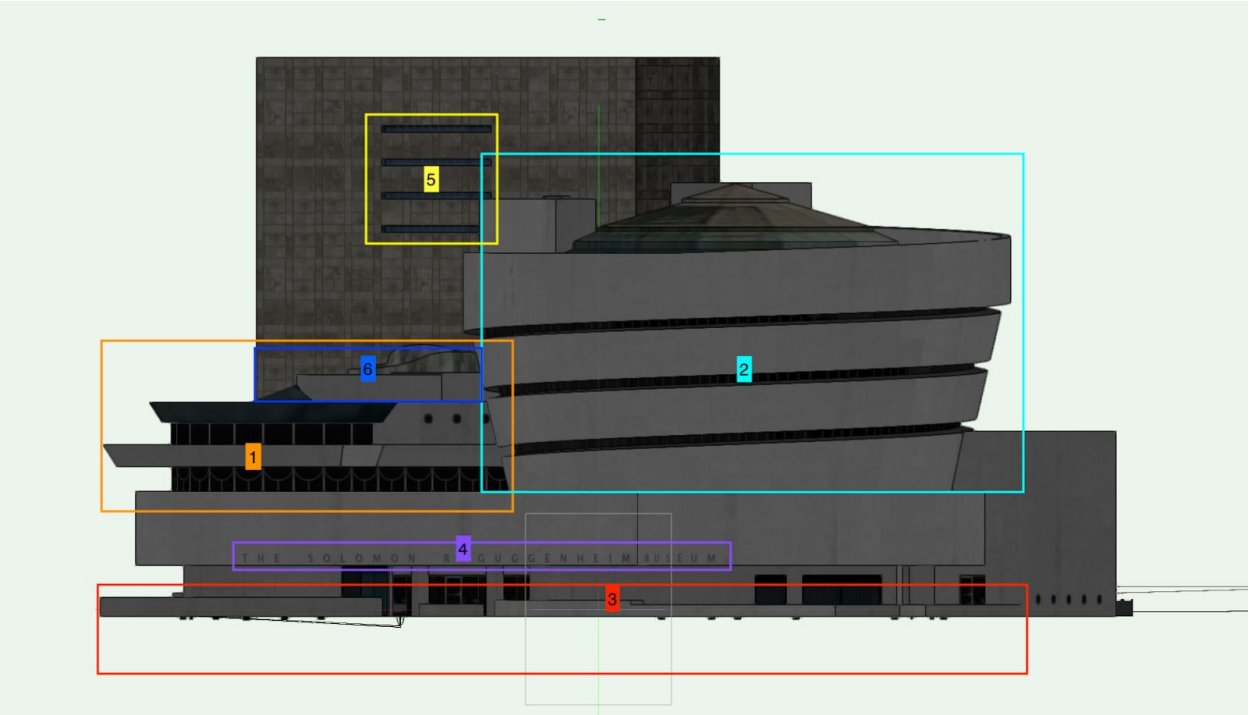
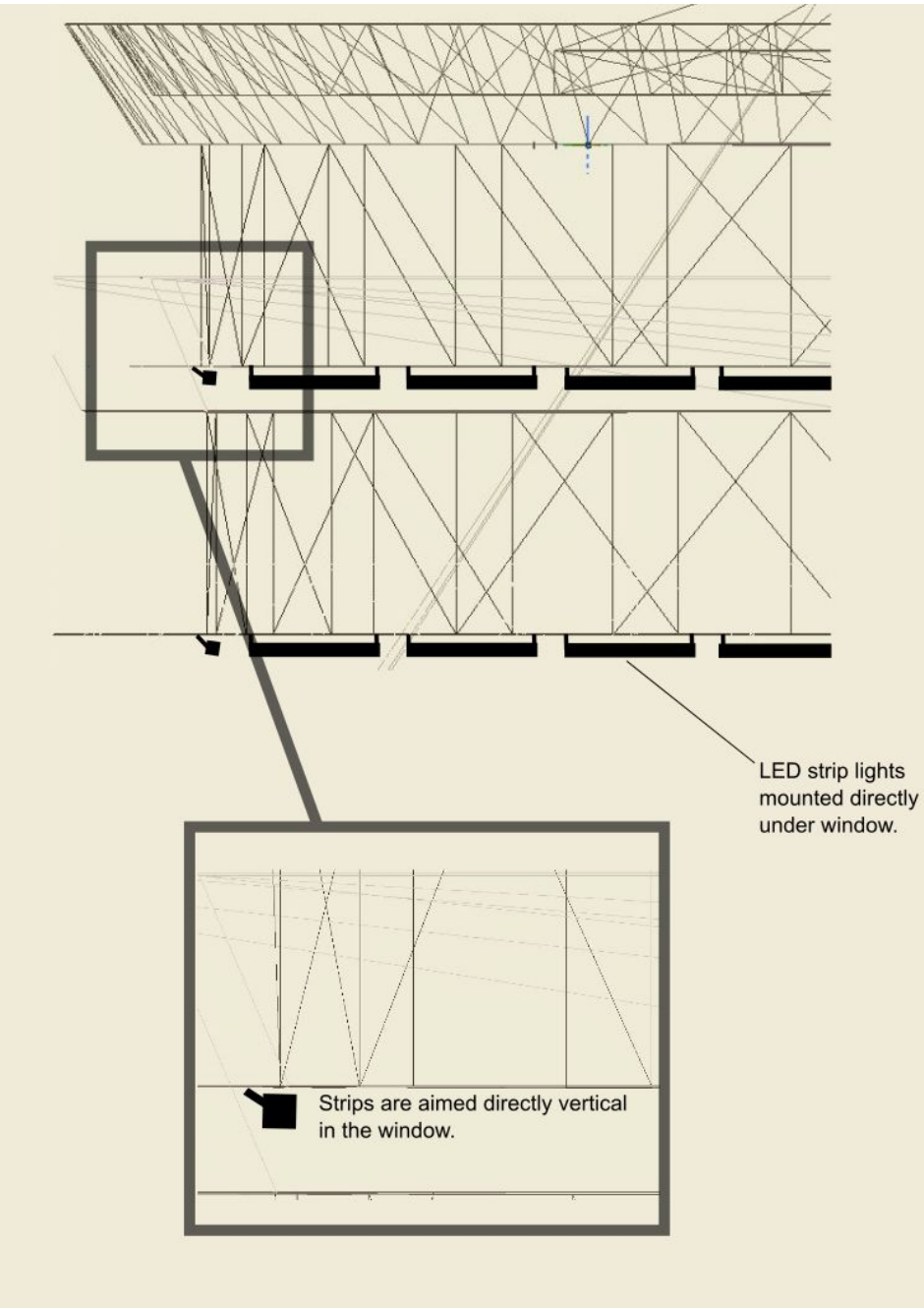
Main Systems:



Main Systems Used:

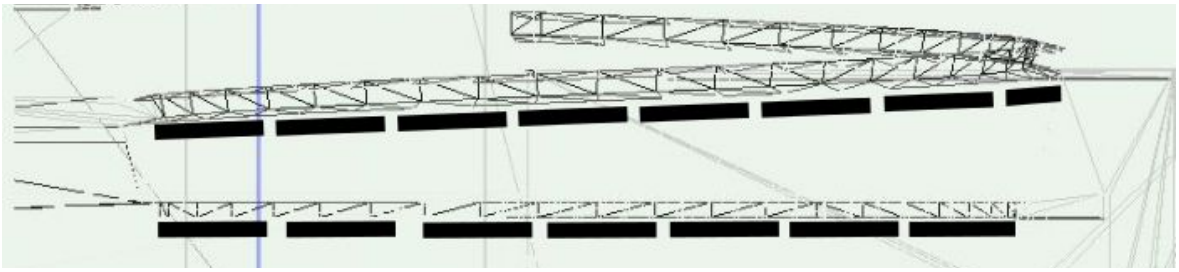
1) **LED Strip Lights - Left Windows**
2) **LED Strip Lights - Right Rotunda**
3) **Inlaid Ground Wash Lights**
4) **Nameplate Lights**
5) **Window Slat LED**
6) **Scrapes**

1) **LED Strip Lights - Left Windows**



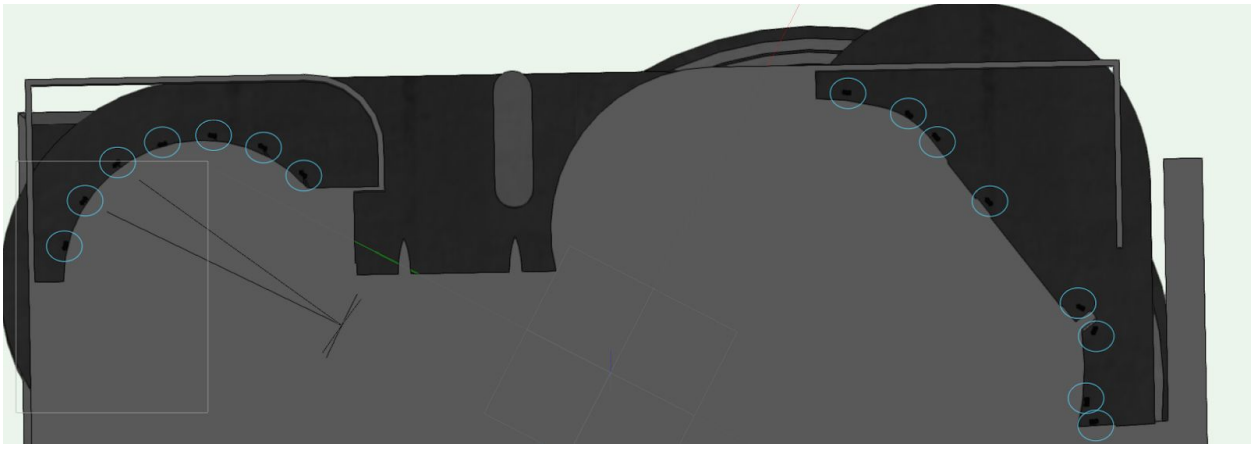
The windows will have LED strip lights mounted directly below them around the entire circle on both levels. These lights will be focused vertically to create a lantern effect all around the building. The strip lights will be placed evenly around the circle with a 6 foot distance between them(as measured around the circumference of the circle).

2) **LED Strip Lights - Right Rotunda**

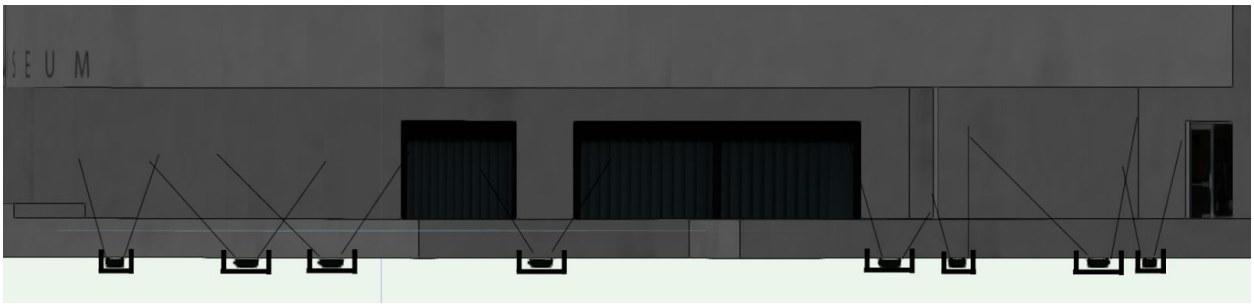


The lighting for the spirals will be internally mounted directly beneath the windows facing upwards towards the outside. The lights will have a 6 foot gap between each fixture.

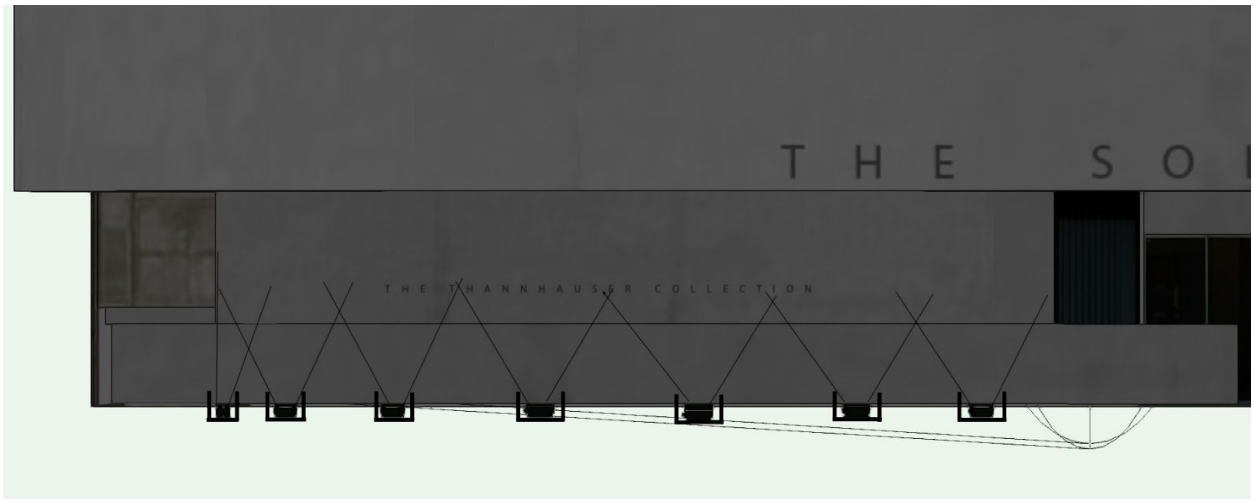
3) **Inlaid Ground Wash Lights**



Each blue circle denotes a light that is inlaid into the concrete.



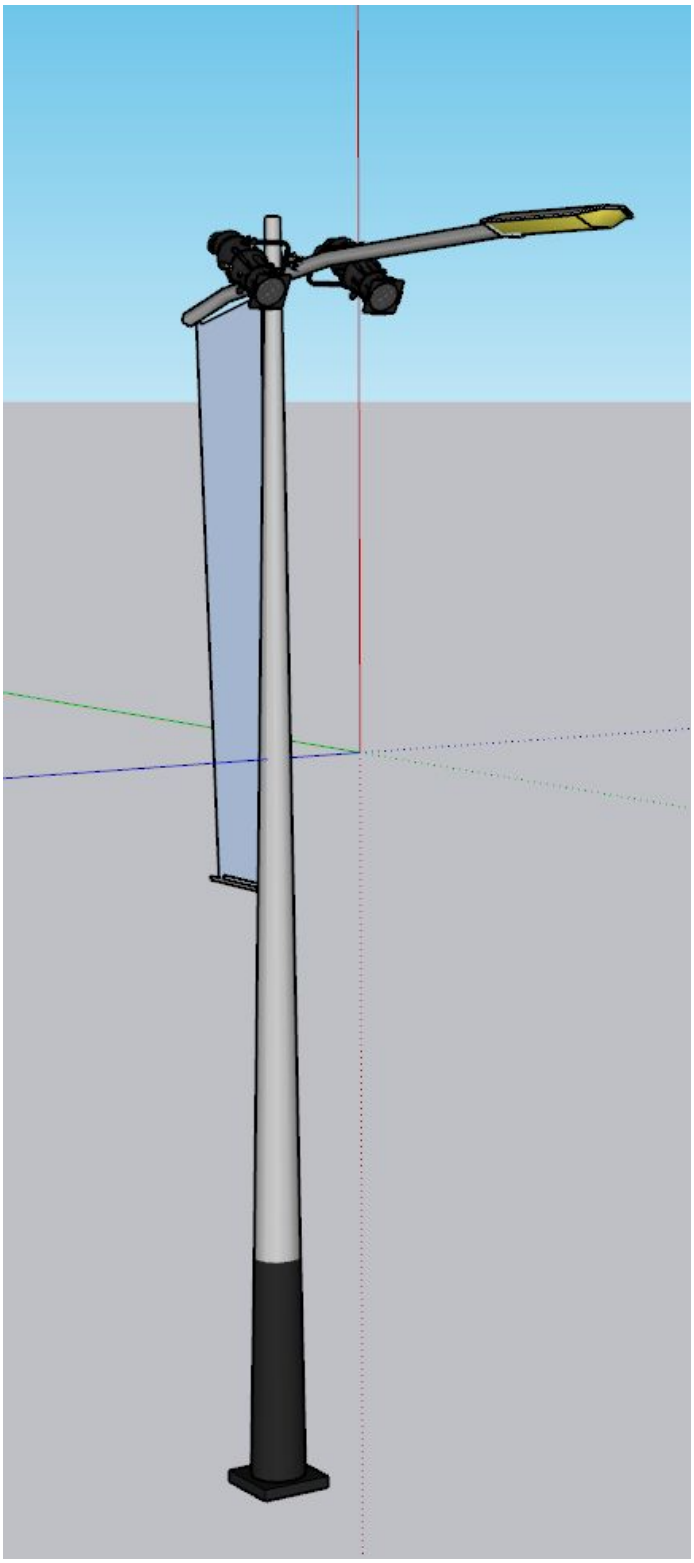
Detail of the right side of the structure and lights that will be inlaid.



Detail of the left side of the structure and the lights that will be inlaid.

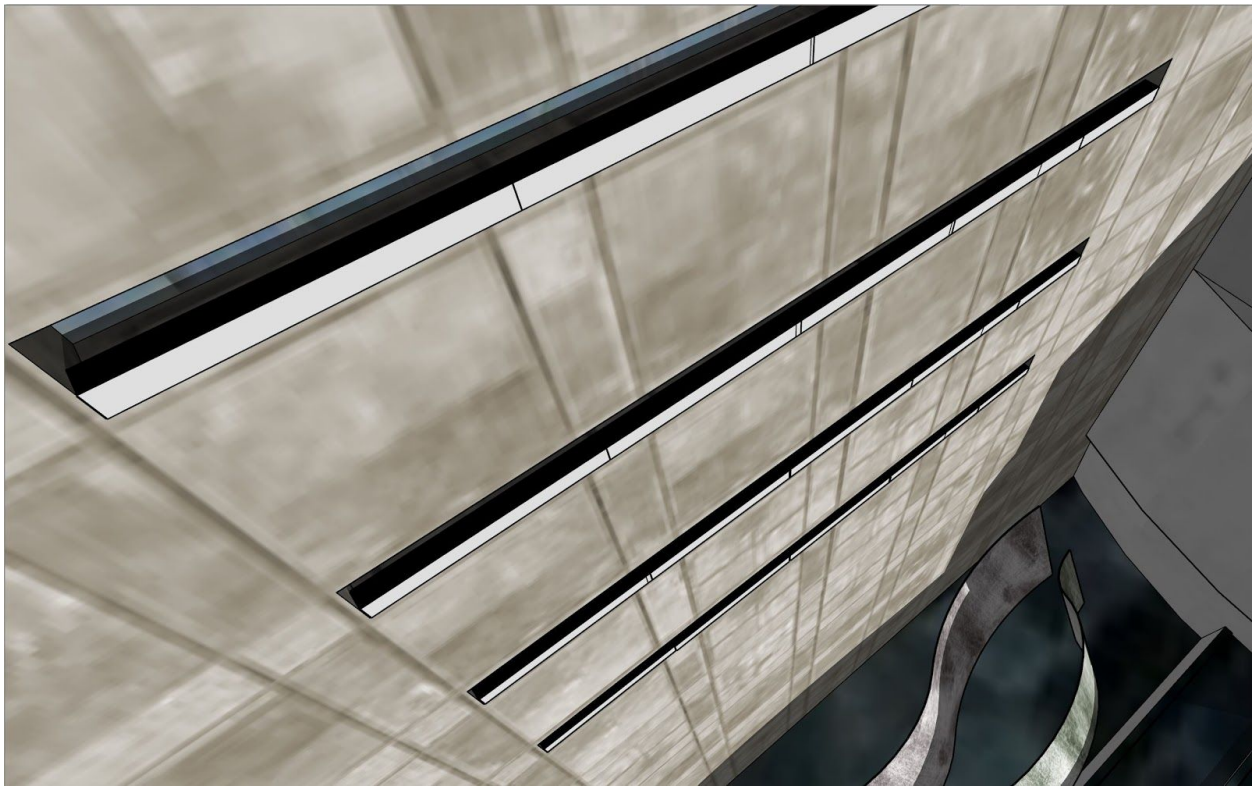
The lights we have chosen are waterproof and constructed to be outside. However, since we are burying them into the ground, we will put a plexiglass box around them. This is to prevent them from being submerged in water.

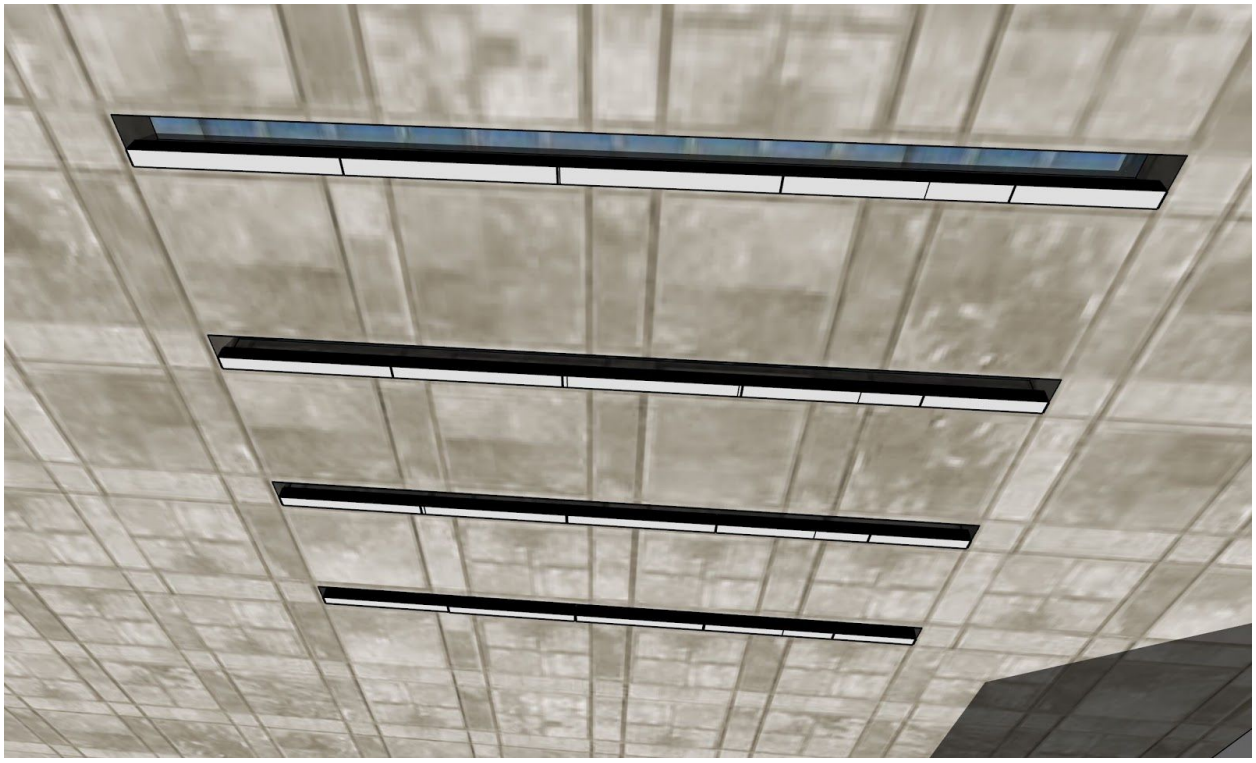
4) **Nameplate Lights**

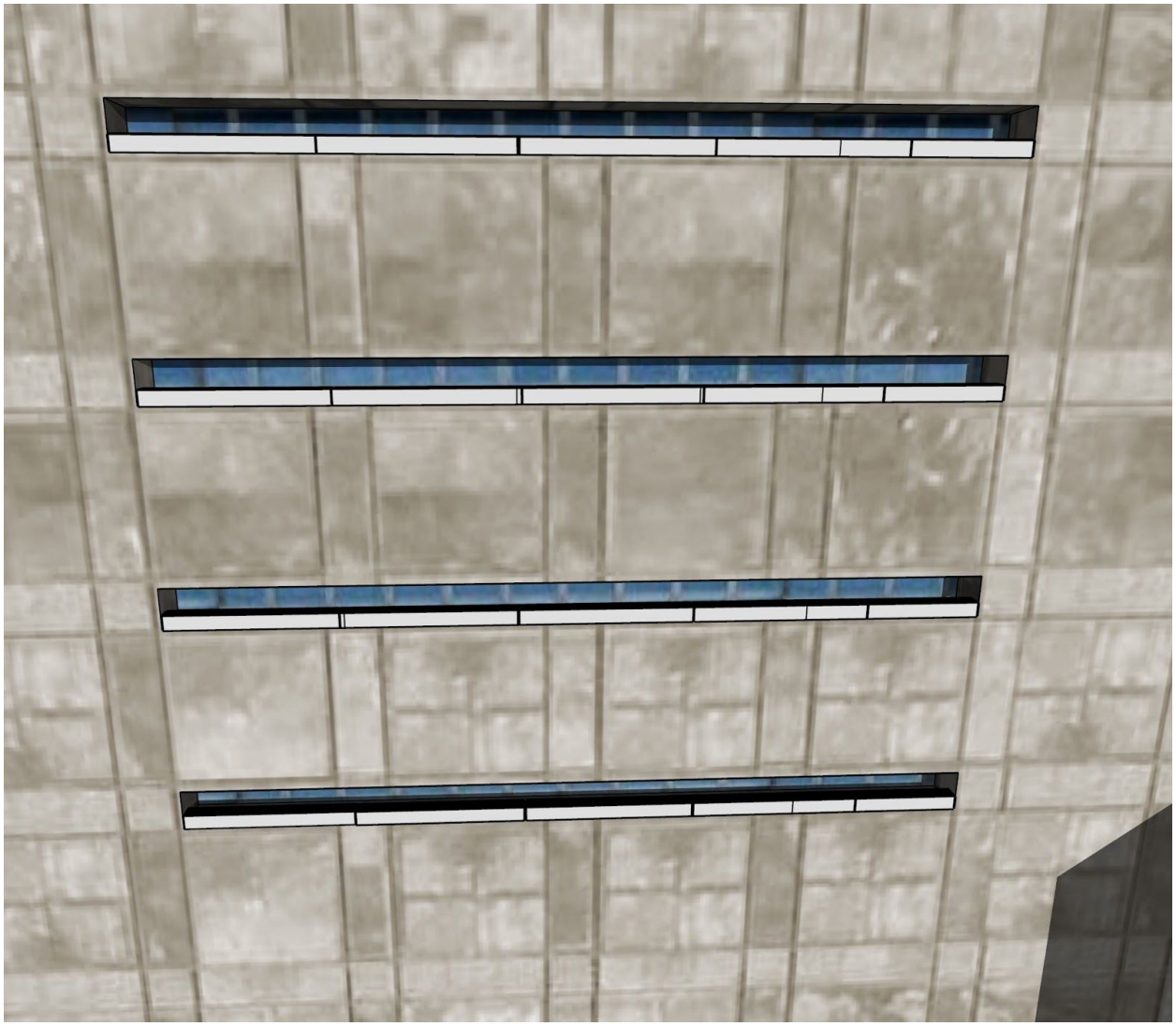


The street lamp is situated directly across from the street from the nameplate of the Guggenheim, and two sources will be used to add additional light to the nameplate. The 2 lighting fixtures will be mounted with yolks bolting directly into the concrete street lamp pole.

5) **Window Slat LED**

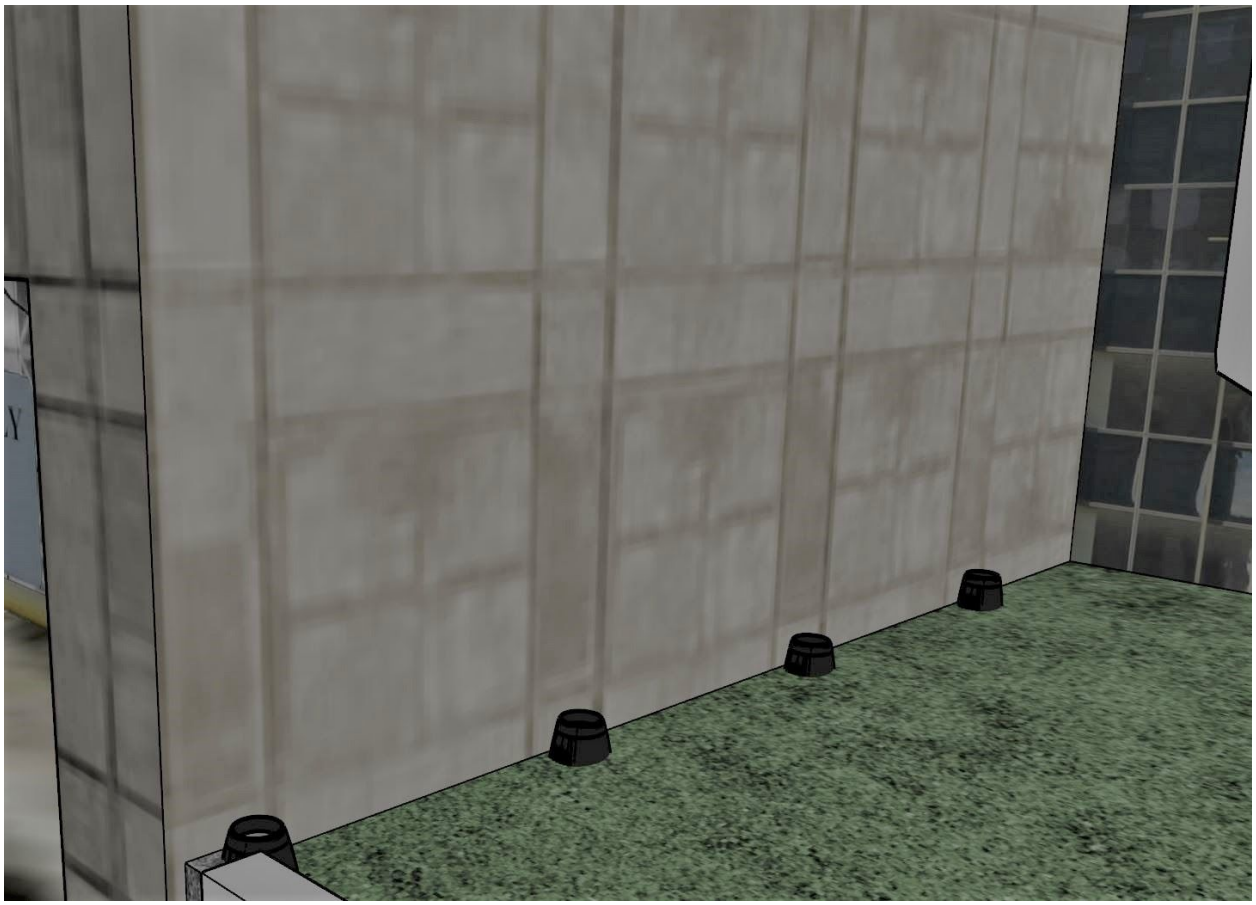


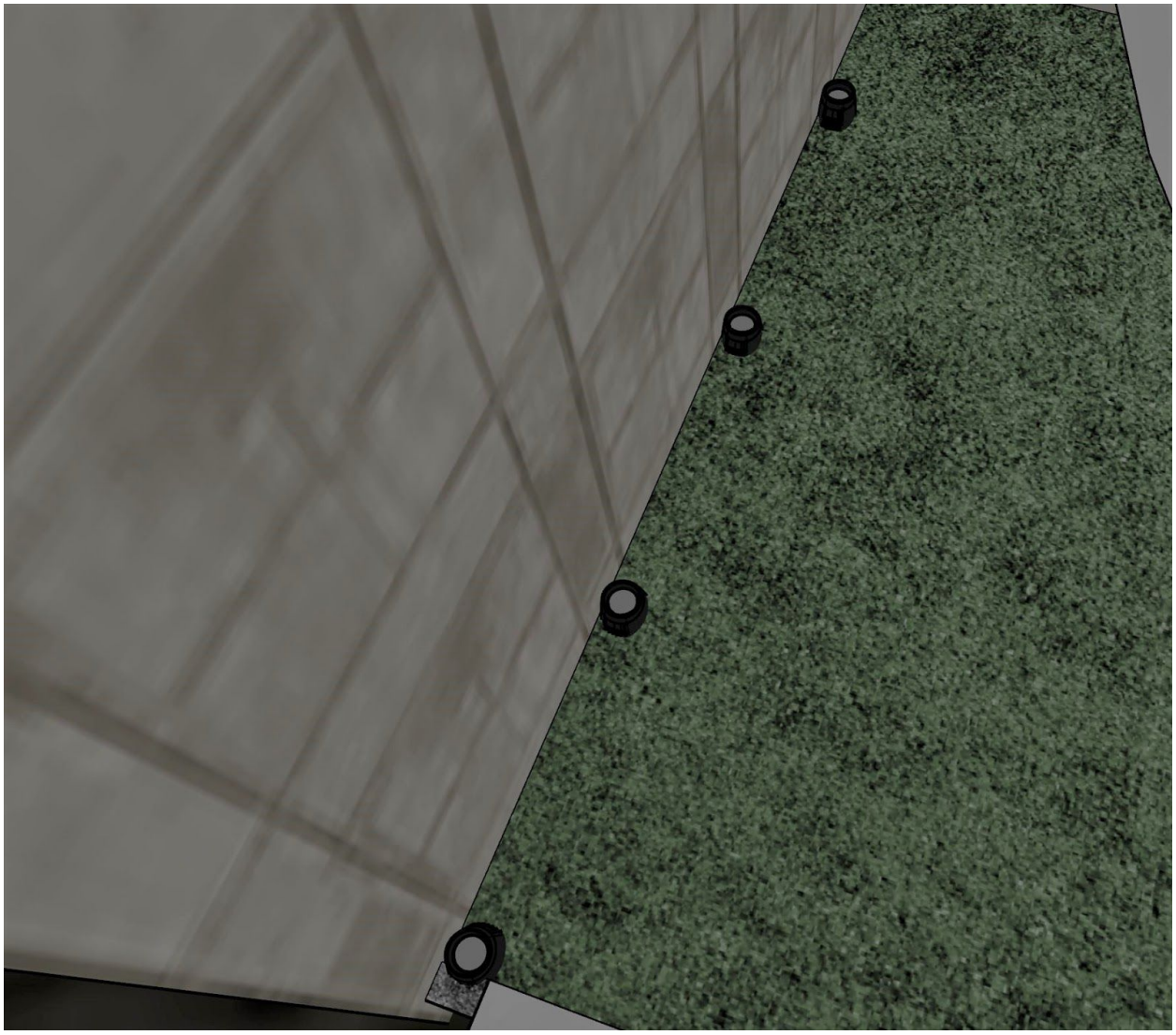


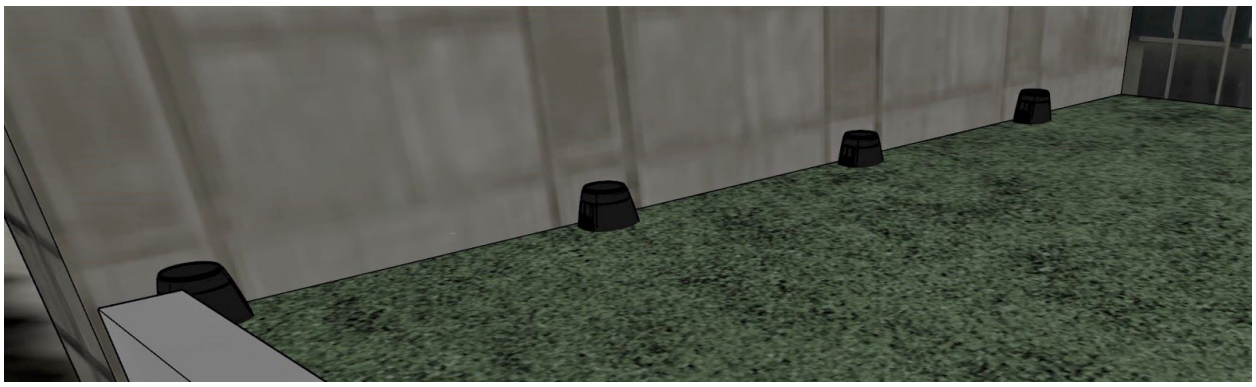


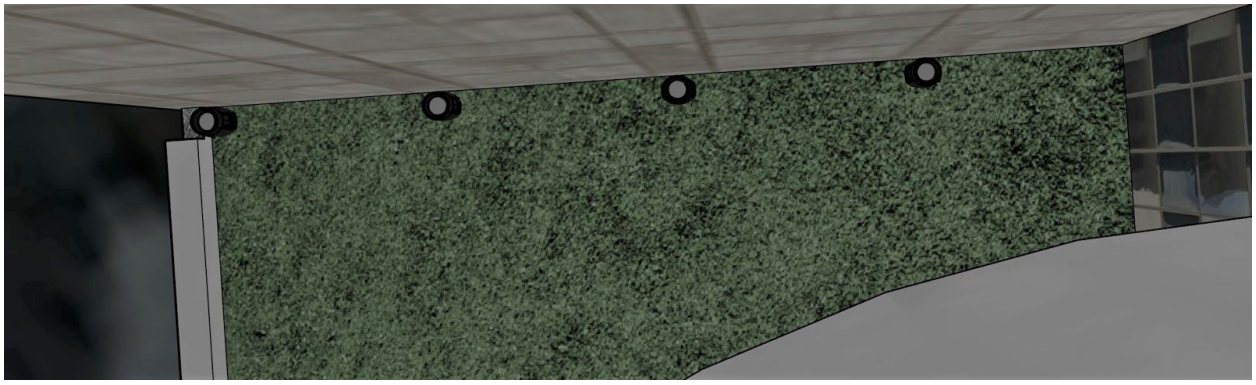
The strip lights will be mounted at the top and bottom of the front edges of each of the 4 window sills. These lights will be focused at a 45 degree angle inwards towards the window. This will cut down on glare while still illuminating the window sills.

6) **Scrapes**









The scrape lights will be embedded in the ground in a similar manner to Zone 3.

Fixtures Used:

Zones 1, 2, 3, & 6 will utilize the SGM I-5 RGBW POI wash fixture as detailed in this link.
https://sgmlight.com/products/architectural/i%C2%B75-rgbw-poi

Zone 4 will utilize the ETC Source Four XT HID outdoor leko as detailed in this link.
https://www.etcconnect.com/Products/Lighting-Fixtures/Legacy/Source-Four-XT-HID/Features.aspx

Zone 5 will utilize the SGM VPL 1220-20 architectural strip lighting as detailed in this link.
https://sgmlight.com/products/architectural/vpl-1220%C2%B720

Light Type	Quantity	Cut Sheet Link
Source Four XT HID	2	https://www.etcconnect.com/Products/Lighting-Fixtures/Legacy/Source-Four-XT-HID/Features.aspx
SGM I-5 RGBW POI	209	https://sgmlight.com/products/architectural/i%C2%B75-rgbw-poi
SGM VPL 1220-20	104	https://sgmlight.com/products/architectural/vpl-1220%C2%B720

SGM I-5 Position Breakdown	
Position	**Quanitity**
Lighthouse	40
Up Lighting for underside	15
Back Wall Scrapes	4
Spiral	150

Lamp	Quanitity
150W Philips MASTERColour CDM 4,200°K	1
150W Philips MASTERColour CDM 3000°K	1

Instrument Schedule				
Light Type	**Area**	**Address**	**Wattage**	**Lamp Type**
S4 XT HID	Lamp Post	1/1	150 W	Philips MasterColor CDM 3000 K
S4 XT HID	Lamp Post	1/2	150 W	Philips MasterColor CDM 4200 K
SGM VPL 1220-20	4 Windows	2/1	35 W	LED
SGM VPL 1220-20	4 Windows	2/7	35 W	LED
SGM VPL 1220-20	4 Windows	2/13	35 W	LED
SGM VPL 1220-20	4 Windows	2/19	35 W	LED
SGM VPL 1220-20	4 Windows	2/25	35 W	LED
SGM VPL 1220-20	4 Windows	2/31	35 W	LED
SGM VPL 1220-20	4 Windows	2/37	35 W	LED
SGM VPL 1220-20	4 Windows	2/43	35 W	LED
SGM VPL 1220-20	4 Windows	2/49	35 W	LED
SGM VPL 1220-20	4 Windows	2/55	35 W	LED
SGM VPL 1220-20	4 Windows	2/61	35 W	LED
SGM VPL 1220-20	4 Windows	2/67	35 W	LED
SGM VPL 1220-20	4 Windows	2/73	35 W	LED
SGM VPL 1220-20	4 Windows	2/79	35 W	LED
SGM VPL 1220-20	4 Windows	2/85	35 W	LED
SGM VPL 1220-20	4 Windows	2/91	35 W	LED
SGM VPL 1220-20	4 Windows	2/97	35 W	LED
SGM VPL 1220-20	4 Windows	2/103	35 W	LED
SGM VPL 1220-20	4 Windows	2/109	35 W	LED
SGM VPL 1220-20	4 Windows	2/115	35 W	LED
SGM VPL 1220-20	4 Windows	2/121	35 W	LED
SGM VPL 1220-20	4 Windows	2/127	35 W	LED
SGM VPL 1220-20	4 Windows	2/133	35 W	LED
SGM VPL 1220-20	4 Windows	2/139	35 W	LED
SGM VPL 1220-20	4 Windows	2/145	35 W	LED
SGM VPL 1220-20	4 Windows	2/151	35 W	LED
SGM VPL 1220-20	4 Windows	2/157	35 W	LED
SGM VPL 1220-20	4 Windows	2/163	35 W	LED
SGM VPL 1220-20	4 Windows	2/169	35 W	LED
SGM VPL 1220-20	4 Windows	2/175	35 W	LED
SGM VPL 1220-20	4 Windows	2/181	35 W	LED
SGM VPL 1220-20	4 Windows	2/187	35 W	LED
SGM VPL 1220-20	4 Windows	2/193	35 W	LED
SGM VPL 1220-20	4 Windows	2/199	35 W	LED
SGM VPL 1220-20	4 Windows	2/205	35 W	LED
SGM VPL 1220-20	4 Windows	2/211	35 W	LED
SGM VPL 1220-20	4 Windows	2/217	35 W	LED
SGM VPL 1220-20	4 Windows	2/223	35 W	LED
SGM VPL 1220-20	4 Windows	2/229	35 W	LED
SGM VPL 1220-20	4 Windows	2/235	35 W	LED

SGM VPL 1220-20	4 Windows	2/241	35 W	LED
SGM VPL 1220-20	4 Windows	2/247	35 W	LED
SGM VPL 1220-20	4 Windows	2/253	35 W	LED
SGM VPL 1220-20	4 Windows	2/259	35 W	LED
SGM VPL 1220-20	4 Windows	2/265	35 W	LED
SGM VPL 1220-20	4 Windows	2/271	35 W	LED
SGM VPL 1220-20	4 Windows	2/277	35 W	LED
SGM VPL 1220-20	4 Windows	2/283	35 W	LED
SGM VPL 1220-20	4 Windows	2/289	35 W	LED
SGM VPL 1220-20	4 Windows	2/295	35 W	LED
SGM VPL 1220-20	4 Windows	2/301	35 W	LED
SGM VPL 1220-20	4 Windows	2/307	35 W	LED
SGM VPL 1220-20	4 Windows	2/313	35 W	LED
SGM VPL 1220-20	4 Windows	2/319	35 W	LED
SGM VPL 1220-20	4 Windows	2/325	35 W	LED
SGM VPL 1220-20	4 Windows	2/331	35 W	LED
SGM VPL 1220-20	4 Windows	2/337	35 W	LED
SGM VPL 1220-20	4 Windows	2/343	35 W	LED
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SGM VPL 1220-20	4 Windows	2/451	35 W	LED
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SGM VPL 1220-20	4 Windows	3/7	35 W	LED
SGM VPL 1220-20	4 Windows	3/13	35 W	LED
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SGM VPL 1220-20	4 Windows	3/25	35 W	LED
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SGM VPL 1220-20	4 Windows	3/37	35 W	LED
SGM VPL 1220-20	4 Windows	3/43	35 W	LED
SGM VPL 1220-20	4 Windows	3/49	35 W	LED
SGM VPL 1220-20	4 Windows	3/55	35 W	LED
SGM VPL 1220-20	4 Windows	3/61	35 W	LED
SGM VPL 1220-20	4 Windows	3/67	35 W	LED
SGM VPL 1220-20	4 Windows	3/73	35 W	LED
SGM VPL 1220-20	4 Windows	3/79	35 W	LED
SGM VPL 1220-20	4 Windows	3/85	35 W	LED
SGM VPL 1220-20	4 Windows	3/91	35 W	LED
SGM VPL 1220-20	4 Windows	3/97	35 W	LED
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SGM VPL 1220-20	4 Windows	3/109	35 W	LED
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SGM VPL 1220-20	4 Windows	3/139	35 W	LED
SGM VPL 1220-20	4 Windows	3/145	35 W	LED
SGM VPL 1220-20	4 Windows	3/151	35 W	LED
SGM I-5 RGBW	Back Scrape	4/1	240 W	LED
SGM I-5 RGBW	Back Scrape	4/7	240 W	LED
SGM I-5 RGBW	Back Scrape	4/13	240 W	LED
SGM I-5 RGBW	Back Scrape	4/19	240 W	LED
SGM I-5 RGBW	Underside	4/25	240 W	LED
SGM I-5 RGBW	Underside	4/31	240 W	LED
SGM I-5 RGBW	Underside	4/37	240 W	LED
SGM I-5 RGBW	Underside	4/43	240 W	LED
SGM I-5 RGBW	Underside	4/49	240 W	LED
SGM I-5 RGBW	Underside	4/55	240 W	LED
SGM I-5 RGBW	Underside	4/61	240 W	LED
SGM I-5 RGBW	Underside	4/67	240 W	LED
SGM I-5 RGBW	Underside	4/73	240 W	LED
SGM I-5 RGBW	Underside	4/79	240 W	LED
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SGM I-5 RGBW	Underside	4/91	240 W	LED
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SGM I-5 RGBW	Underside	4/103	240 W	LED
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SGM I-5 RGBW	Lighthouse	4/139	240 W	LED

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SGM I-5 RGBW	Lighthouse	4/163	240 W	LED
SGM I-5 RGBW	Lighthouse	4/169	240 W	LED
SGM I-5 RGBW	Lighthouse	4/175	240 W	LED
SGM I-5 RGBW	Lighthouse	4/181	240 W	LED
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SGM I-5 RGBW	Spiral	5/43	240 W	LED
SGM I-5 RGBW	Spiral	5/49	240 W	LED

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SGM I-5 RGBW	Spiral	5/67	240 W	LED
SGM I-5 RGBW	Spiral	5/73	240 W	LED
SGM I-5 RGBW	Spiral	5/79	240 W	LED
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SGM I-5 RGBW	Spiral	5/97	240 W	LED
SGM I-5 RGBW	Spiral	5/103	240 W	LED
SGM I-5 RGBW	Spiral	5/109	240 W	LED
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SGM I-5 RGBW	Spiral	5/121	240 W	LED
SGM I-5 RGBW	Spiral	5/127	240 W	LED
SGM I-5 RGBW	Spiral	5/133	240 W	LED
SGM I-5 RGBW	Spiral	5/139	240 W	LED
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SGM I-5 RGBW	Spiral	5/151	240 W	LED
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SGM I-5 RGBW	Spiral	5/169	240 W	LED
SGM I-5 RGBW	Spiral	5/175	240 W	LED
SGM I-5 RGBW	Spiral	5/181	240 W	LED
SGM I-5 RGBW	Spiral	5/187	240 W	LED
SGM I-5 RGBW	Spiral	5/193	240 W	LED
SGM I-5 RGBW	Spiral	5/199	240 W	LED
SGM I-5 RGBW	Spiral	5/205	240 W	LED
SGM I-5 RGBW	Spiral	5/211	240 W	LED
SGM I-5 RGBW	Spiral	5/217	240 W	LED
SGM I-5 RGBW	Spiral	5/223	240 W	LED
SGM I-5 RGBW	Spiral	5/229	240 W	LED
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SGM I-5 RGBW	Spiral	6/1	240 W	LED
SGM I-5 RGBW	Spiral	6/7	240 W	LED
SGM I-5 RGBW	Spiral	6/13	240 W	LED

SGM I-5 RGBW	Spiral	6/19	240 W	LED
SGM I-5 RGBW	Spiral	6/25	240 W	LED
SGM I-5 RGBW	Spiral	6/31	240 W	LED
SGM I-5 RGBW	Spiral	6/37	240 W	LED
SGM I-5 RGBW	Spiral	6/43	240 W	LED
SGM I-5 RGBW	Spiral	6/49	240 W	LED
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SGM I-5 RGBW	Spiral	6/61	240 W	LED
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SGM I-5 RGBW	Spiral	6/73	240 W	LED
SGM I-5 RGBW	Spiral	6/79	240 W	LED
SGM I-5 RGBW	Spiral	6/85	240 W	LED
SGM I-5 RGBW	Spiral	6/91	240 W	LED
SGM I-5 RGBW	Spiral	6/97	240 W	LED
SGM I-5 RGBW	Spiral	6/103	240 W	LED
SGM I-5 RGBW	Spiral	6/109	240 W	LED
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SGM I-5 RGBW	Spiral	6/127	240 W	LED
SGM I-5 RGBW	Spiral	6/133	240 W	LED
SGM I-5 RGBW	Spiral	6/139	240 W	LED
SGM I-5 RGBW	Spiral	6/145	240 W	LED
SGM I-5 RGBW	Spiral	6/151	240 W	LED
SGM I-5 RGBW	Spiral	6/157	240 W	LED
SGM I-5 RGBW	Spiral	6/163	240 W	LED
SGM I-5 RGBW	Spiral	6/169	240 W	LED
SGM I-5 RGBW	Spiral	6/175	240 W	LED
SGM I-5 RGBW	Spiral	6/181	240 W	LED
SGM I-5 RGBW	Spiral	6/187	240 W	LED
SGM I-5 RGBW	Spiral	6/193	240 W	LED
SGM I-5 RGBW	Spiral	6/199	240 W	LED
SGM I-5 RGBW	Spiral	6/205	240 W	LED
SGM I-5 RGBW	Spiral	6/211	240 W	LED
SGM I-5 RGBW	Spiral	6/217	240 W	LED
SGM I-5 RGBW	Spiral	6/223	240 W	LED
SGM I-5 RGBW	Spiral	6/229	240 W	LED
SGM I-5 RGBW	Spiral	6/235	240 W	LED
SGM I-5 RGBW	Spiral	6/241	240 W	LED
SGM I-5 RGBW	Spiral	6/247	240 W	LED
SGM I-5 RGBW	Spiral	6/253	240 W	LED
SGM I-5 RGBW	Spiral	6/259	240 W	LED
SGM I-5 RGBW	Spiral	6/265	240 W	LED
SGM I-5 RGBW	Spiral	6/271	240 W	LED
SGM I-5 RGBW	Spiral	6/277	240 W	LED

SGM I-5 RGBW	Spiral	6/283	240 W	LED
SGM I-5 RGBW	Spiral	6/289	240 W	LED
SGM I-5 RGBW	Spiral	6/295	240 W	LED
SGM I-5 RGBW	Spiral	7/1	240 W	LED
SGM I-5 RGBW	Spiral	7/7	240 W	LED
SGM I-5 RGBW	Spiral	7/13	240 W	LED
SGM I-5 RGBW	Spiral	7/19	240 W	LED
SGM I-5 RGBW	Spiral	7/25	240 W	LED
SGM I-5 RGBW	Spiral	7/31	240 W	LED
SGM I-5 RGBW	Spiral	7/37	240 W	LED
SGM I-5 RGBW	Spiral	7/43	240 W	LED
SGM I-5 RGBW	Spiral	7/49	240 W	LED
SGM I-5 RGBW	Spiral	7/55	240 W	LED
SGM I-5 RGBW	Spiral	7/61	240 W	LED
SGM I-5 RGBW	Spiral	7/67	240 W	LED
SGM I-5 RGBW	Spiral	7/73	240 W	LED
SGM I-5 RGBW	Spiral	7/79	240 W	LED
SGM I-5 RGBW	Spiral	7/85	240 W	LED
SGM I-5 RGBW	Spiral	7/91	240 W	LED
SGM I-5 RGBW	Spiral	7/97	240 W	LED
SGM I-5 RGBW	Spiral	7/103	240 W	LED
SGM I-5 RGBW	Spiral	7/109	240 W	LED
SGM I-5 RGBW	Spiral	7/115	240 W	LED
SGM I-5 RGBW	Spiral	7/121	240 W	LED
SGM I-5 RGBW	Spiral	7/127	240 W	LED
SGM I-5 RGBW	Spiral	7/133	240 W	LED
SGM I-5 RGBW	Spiral	7/139	240 W	LED
SGM I-5 RGBW	Spiral	7/145	240 W	LED
SGM I-5 RGBW	Spiral	7/151	240 W	LED
SGM I-5 RGBW	Spiral	7/157	240 W	LED
SGM I-5 RGBW	Spiral	7/163	240 W	LED
SGM I-5 RGBW	Spiral	7/169	240 W	LED
SGM I-5 RGBW	Spiral	7/175	240 W	LED
SGM I-5 RGBW	Spiral	7/181	240 W	LED
SGM I-5 RGBW	Spiral	7/187	240 W	LED
SGM I-5 RGBW	Spiral	7/193	240 W	LED
SGM I-5 RGBW	Spiral	7/199	240 W	LED
SGM I-5 RGBW	Spiral	7/205	240 W	LED
SGM I-5 RGBW	Spiral	7/211	240 W	LED
SGM I-5 RGBW	Spiral	7/217	240 W	LED
SGM I-5 RGBW	Spiral	7/223	240 W	LED
SGM I-5 RGBW	Spiral	7/229	240 W	LED
SGM I-5 RGBW	Spiral	7/235	240 W	LED
SGM I-5 RGBW	Spiral	7/241	240 W	LED

SGM I-5 RGBW	Spiral	7/247	240 W	LED
SGM I-5 RGBW	Spiral	7/253	240 W	LED
SGM I-5 RGBW	Spiral	7/259	240 W	LED
SGM I-5 RGBW	Spiral	7/265	240 W	LED
SGM I-5 RGBW	Spiral	7/271	240 W	LED
SGM I-5 RGBW	Spiral	7/277	240 W	LED
SGM I-5 RGBW	Spiral	7/283	240 W	LED
SGM I-5 RGBW	Spiral	7/289	240 W	LED
SGM I-5 RGBW	Spiral	7/295	240 W	LED

Light Type	Quantity	Price Per Light	Total
Source Four XT HID	2	$950	$1,900
SGM I-5 RGBW POI	209	$6,972.39	$1,457,229.51
SGM VPL 1220-20	104	$788.29	$81,982.16
		Grand Total	**$ 1,541,111.67**

Light Type	Average Lifespan	Hours/Year	Replacement time
Source Four XT HID	12000	4286	2.79 Years
SGM I-5 RGBW POI	50000	4286	11.66 Years
SGM VPL 1220-20	50000	4286	11.66 Years

Light Type	Watts	Number of Lights	Total KW/H
Source Four XT HID	150	2	0.3
SGM I-5 RGBW POI	240	209	50.16
SGM VPL 1220-20	35	104	3.64
		TOTAL	54.1

Month	Average Nighttime Hours	Days	KWHs Per Month
Jan	14	31	23,479.40
Feb	13	28	19,692.40
Mar	12	31	20,125.20
Apr	11	30	17,853
May	10	31	16,771
Jun	9	30	14,607
Jul	9	31	15,093.90
Aug	10	31	16,771
Sep	12	30	19,476
Oct	13	31	21,802.30
Nov	14	30	22,722
Dec	14	31	23,479.40
TOTAL KWH/ Year	231,872.60		
Price/KWH	$0.13		
ESTIMATED COST	$30,143.44		

System 1:
LED Strip Lights -> Channels -> control board

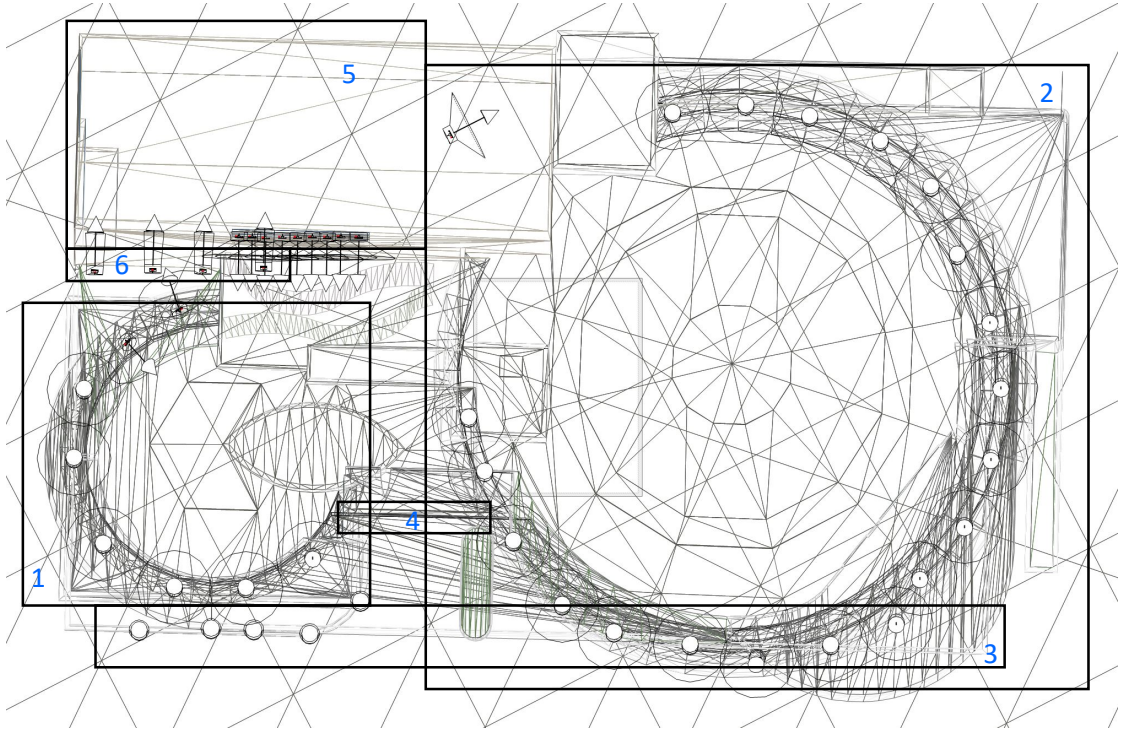
RGBW LED Flood Light (i-5 POI)

System 2:
LED Strip Lights -> Channels -> control board

RGBW LED Flood Light (i-5 POI)

System 3:
Inlaid Ground Wash Lights -> Channels -> control board

RGBW LED Flood Light (i-5 POI)



System 4:
Nameplate Lights -> Channels -> control board

Source Four XT HID

System 5:
Window LED Strip Lights -> Channels -> control board

LED Video Pixel Linear (VPL 1220-20)

System 6:
Inlaid Ground Scrapes -> Channels -> control board

RGBW LED Flood Light (i-5 POI)

System 1

Upper Level

Control Source

Wireless Control

Starting in the SW point of the circle, units will be addressed going counterclockwise around the circle.

4/115-120 — 4/121-126 — 4/127-132 — 4/133-138 — 4/139-144 — 4/145-150 — 4/151-156 — 4/157-162 — 4/163-168 — 4/169-174

4/175-180 — 4/181-186 — 4/187-192 — 4/193-198 — 4/199-204 — 4/205-210 — 4/211-216 — 4/217-222 — 4/223-228 — 4/229-234

Lower Level

Control Source

Wireless Control

4/235-240 — 4/241-246 — 4/247-252 — 4/253-258 — 4/259-264 — 4/265-270 — 4/271-276 — 4/277-282 — 4/283-288 — 4/289-294

4/295-300 — 4-301-306 — 4/307-312 — 4/313-318 — 4/319-324 — 4/325-330 — 4/331-336 — 4/337-342 — 4/343-348 — 4/349-354

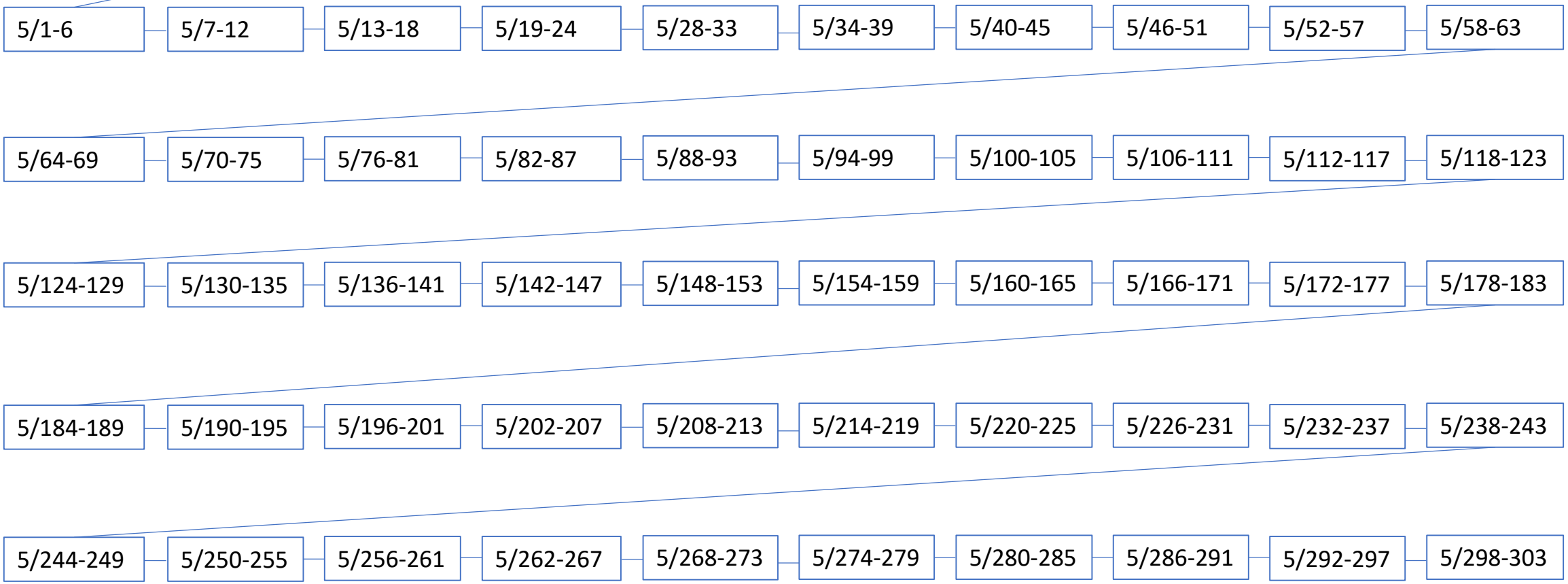
System 2

Top Spiral

Control Source

Wireless Control

Starting in the SW point of the circle, units will be addressed going clockwise around the circle.



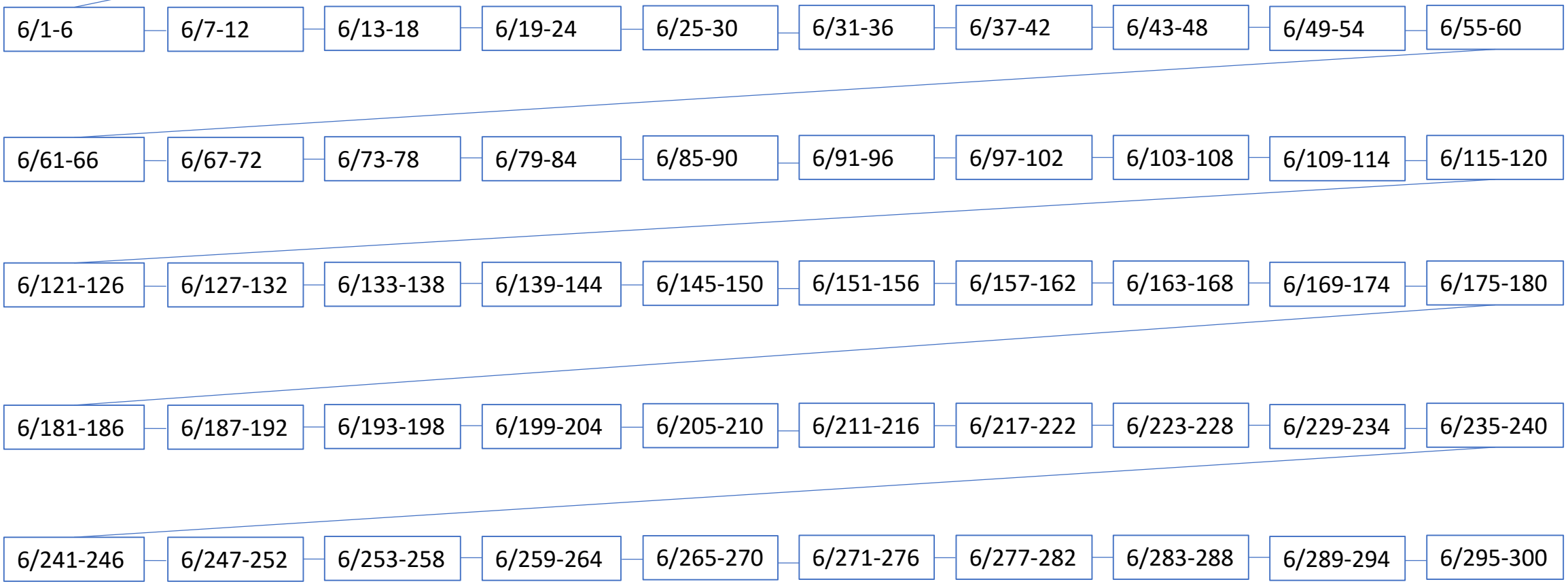
System 2

Middle Spiral

Control Source

Wireless Control

Starting in the SW point of the circle, units will be addressed going clockwise around the circle.



System 2

Bottom Spiral

Control Source

Wireless Control

Starting in the SW point of the circle, units will be addressed going clockwise around the circle.

7/1-6	7/7-12	7/13-18	7/19-24	7/25-30	7/31-36	7/37-42	7/43-48	7/49-54	7/55-60
7/61-66	7/67-72	7/73-78	7/79-84	7/85-90	7/91-96	7/97-102	7/103-108	7/109-114	7/115-120
7/121-126	7/127-132	7/133-138	7/139-144	7/145-150	7/151-156	7/157-162	7/163-168	7/169-174	7/175-180
7/181-186	7/187-192	7/193-198	7/199-204	7/205-210	7/211-216	7/217-222	7/223-228	7/229-234	7/235-240
7/241-246	7/247-252	7/253-258	7/259-264	7/265-270	7/271-276	7/277-282	7/283-288	7/289-294	7/295-300

System 3

Control Source

Wireless Control

4/25-30 — 4/31-36 — 4/37-42 — 4/43-48 — 4/49-54

4/79-84 — 4/73-78 — 4/67-72 — 4/61-66 — 4/55-60

4/85-90 — 4/91-96 — 4/97-102 — 4/103-108 — 4/109-114

Units will be addressed from eastern most to western most.

System 4

Control Source

Wireless Control

1/1 — 1/2

The background color of the address indicates which unit will receive which address(blue being the cool unit, orange being the warm unit)

System 6

Control Source

Wireless Control

4/1-6 — 4/7-12 — 4/13-18 — 4/19-24

Units will be addressed from eastern most to western most.

System 5

Top Window

Control Source

Wireless Control

Looking from 5th Ave, units will be addressed from left to right.

2/1-6 — 2/7-12 — 2/13-18 — 2/19-24 — 2/25-30 — 2/31-36 — 2/37-42 — 2/43-48 — 2/49-54 — 2/55-60

2/61-66 — 2/67-72 — 2/73-78 — 2/79-84 — 2/85-90 — 2/91-96 — 2/97-102 — 2/103-108 — 2/109-114 — 2/115-120

Second Window

Control Source

Wireless Control

Looking from 5th Ave, units will be addressed from left to right.

2/121-126 — 2/127-132 — 2/133-138 — 2/139-144 — 2/145-150 — 2/151-156 — 2/157-162 — 2/163-168 — 2/169-174 — 2/175-180

2/181-186 — 2/187-192 — 2/193-198 — 2/199-204 — 2/205-210 — 2/211-216 — 2/217-222 — 2/223-228 — 2/229-234 — 2/235-240

System 5

Third Window

Control Source

Wireless Control

Looking from 5th Ave, units will be addressed from left to right.

2/241-246 — 2/247-252 — 2/253-258 — 2/259-264 — 2/265-270 — 2/271-276 — 2/277-282 — 2/283-288 — 2/289-294 — 2/295-300

2/301-306 — 2/307-312 — 2/313-318 — 2/319-324 — 2/325-330 — 2/331-336 — 2/337-342 — 2/343-248 — 2/249-254 — 2/255-260

Bottom Window

Control Source

Wireless Control

Looking from 5th Ave, units will be addressed from left to right.

2/261-266 — 2/267-272 — 2/273-278 — 2/279-284 — 2/285-290 — 2/291-296 — 2/297-302 — 2/303-308 — 2/309-314 — 2/315-320

2/321-326 — 2/327-332 — 2/333-338 — 2/339-344 — 2/345-350 — 2/351-356 — 2/357-362 — 2/363-368 — 2/369-374 — 2/375-380