

The TaoTie Building

a museum of the photon

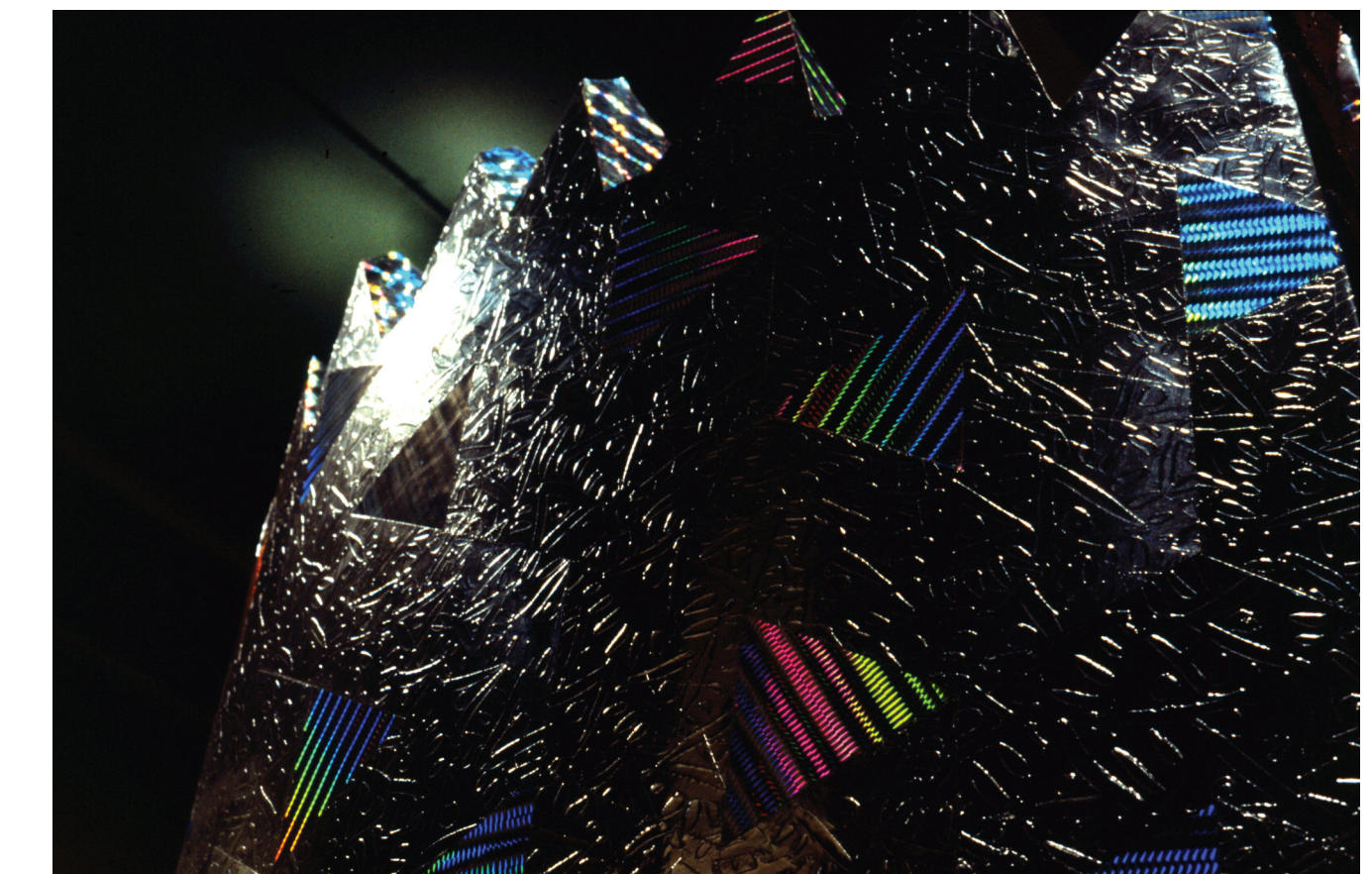
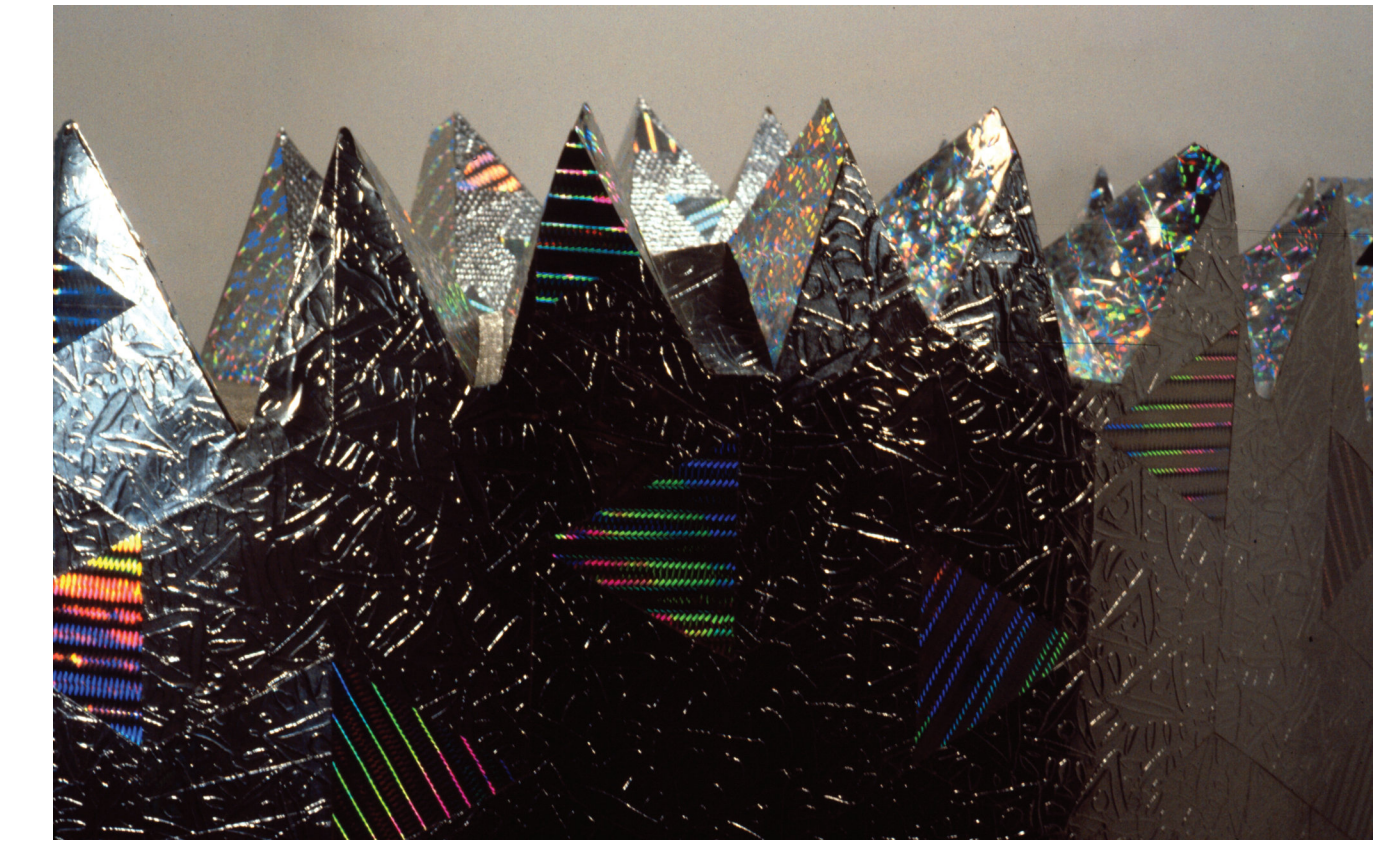
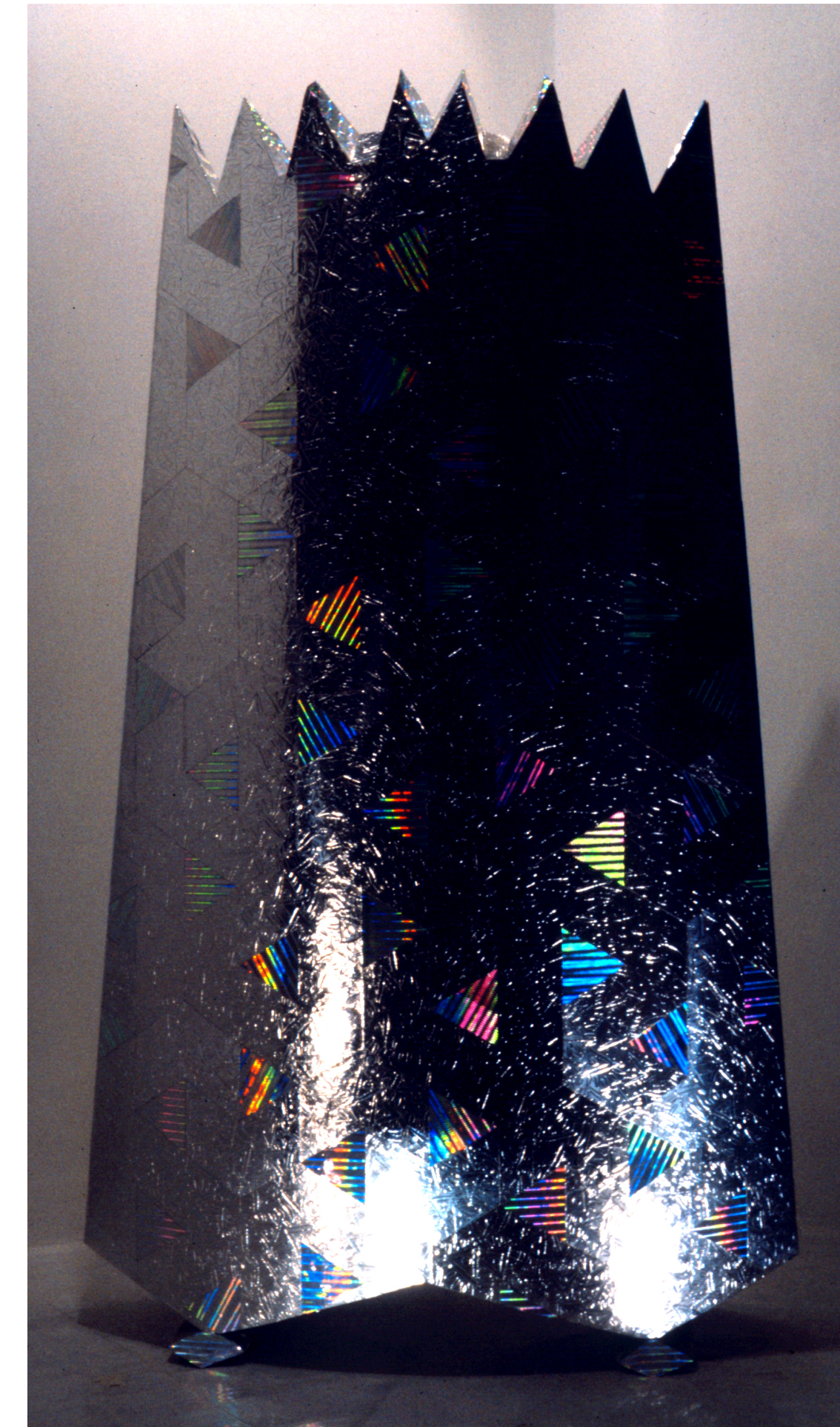
Origins

The origin of this concept came from a series of free standing sculptures I made. These were based on Feynman diagrams of virtual events (see 'Visual Resources' - G). It also mirrors the outline of the 'vesica piscis' pathways that can be found in several places on site (see E,F).

This forms the overall 'plan' view of the work but the sculpture contains much more information. The whole is covered in aluminium foil embossed through an etching printing process. These are then cut into tiles that form tessellations across the surface in geometric designs. Interwoven into this tessellation are iridescent elements (triangles) that reflect different colours as the viewer walks around. These give the object a further (holographic) identity. Each element of the tessellation contains a pattern that activates its surface. On top of the work is a 'crown' that gives the implication that the whole body of the object is made of iridescence.

The name 'TaoTie' comes from ancient Chinese pottery (A) and refers to 'opposing dragon masks'. This is referred to by the carved structural elements (stacked triangles) running up each end of the work. Supporting the sculpture are four 'feet' that have the ends tilted upwards to reflect the light and give the impression that the object is supported by light and could float off at any moment.

Right: Views of TaoTie 3 under artificial light and against the mirror of the Ballet Room



Outline Proposal

The TaoTie Building

My proposal would be to re-interpret this piece as a 200 ft tower, whilst addressing the architectural/structural concerns and opportunities. The building would operate visually by reflection and refraction but could be lit if needed by modest down-lighting from the top. As such it would embody all the visual aspects of light without necessarily needing to be intrinsically radiant of light. In terms of its architectural interpretation it can be divided into 5 parts:

1) The Crown: In the sculpture it is filled with diffraction foil. In the building it would be a viewing platform with an added atrium in the middle to house the top floor lift / cafe. This would consist of a matrix structure of open steel-work (see B) and glass enclosed steel-work for the Atrium. This would form an observatory for the surrounding landscape and also the aircraft passing overhead.

2) The Body: This would be a structure of steel/concrete with polished stainless steel cladding (see C,J) and inset windows (see D1,2,3). The structure would be monocoque in nature to allow open areas on each floor. The stainless steel would be made into the 'chevron' tiles (or themselves made from 4 triangles) and tessellated as in the sculpture. The patterns on the tiles will activate the surface so it is visible. It could be a schematic of the stars in the night sky or be designed by children from local schools? I am thinking they could be asked to do drawings of what patterns they see when they close their eyes - i.e. 'light' emanating from the retina / brain. These would be etched or laser cut onto the tiles.

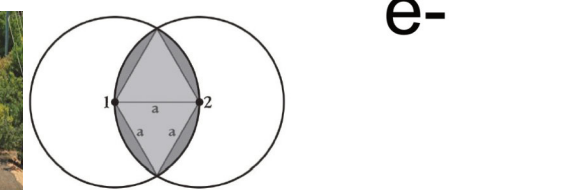
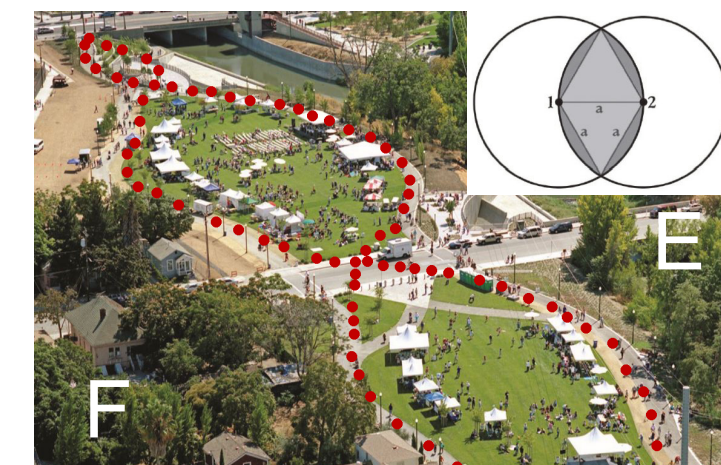
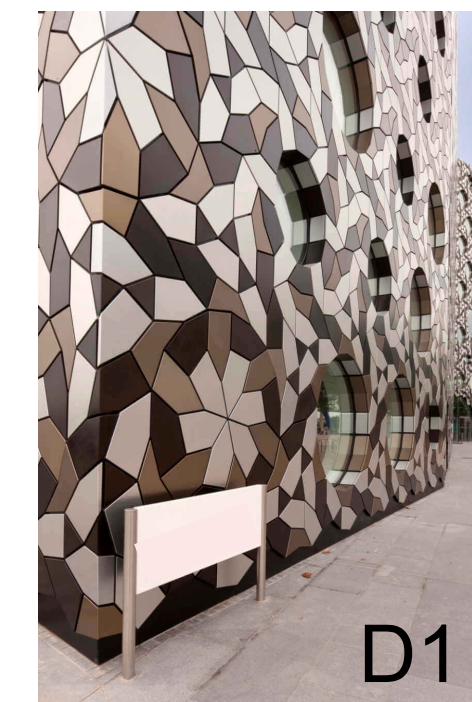
The iridescent triangles would be inset windows at alternate spacing. These would be coated with translucent iridescent foil internally or around the frames.. The Body would be divided into several floors which would incorporate a public reception area on the first floor and a 'Museum of the Photon' on the ascending floors. This would engage with the history of light in all its many forms and interpretations. It would also incorporate a library, seminar/lecture rooms and admin.

3) The Base: This would form the support for the structure and consist of a 'scissor' type crossover that would bind into the foundations where the 'feet' are. The triangular area under the centre could be used for above ground utilities and the 2 pitched areas at either end as entrance portals. These would be made using concrete formwork.

4) Basement: Incorporated into the foundations would be for below ground storage and secure car parking for staff and visitors.

5) The Risers: At each end, and rising the height of the building would be a run of windows to the galleries. There would be an uninterrupted window per floor. These would allow light into the building and also views towards the airport and to the South.

Visual Resources



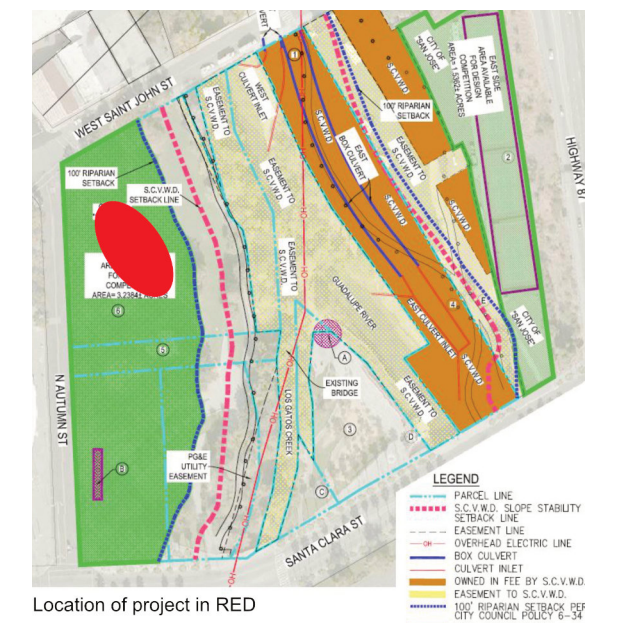
Dimensions and 'Fit to Site'

Given the flight path restrictions, the Tower can be no more than 200 ft high. This gives a reasonable idea of the overall dimensions assuming adherence to proportion. So, if H=200 ft then Wside = 108 ft (Base) / 87 ft (Crown) and Wfront = 60 ft at the Base and 48 ft (at the 'Crown').

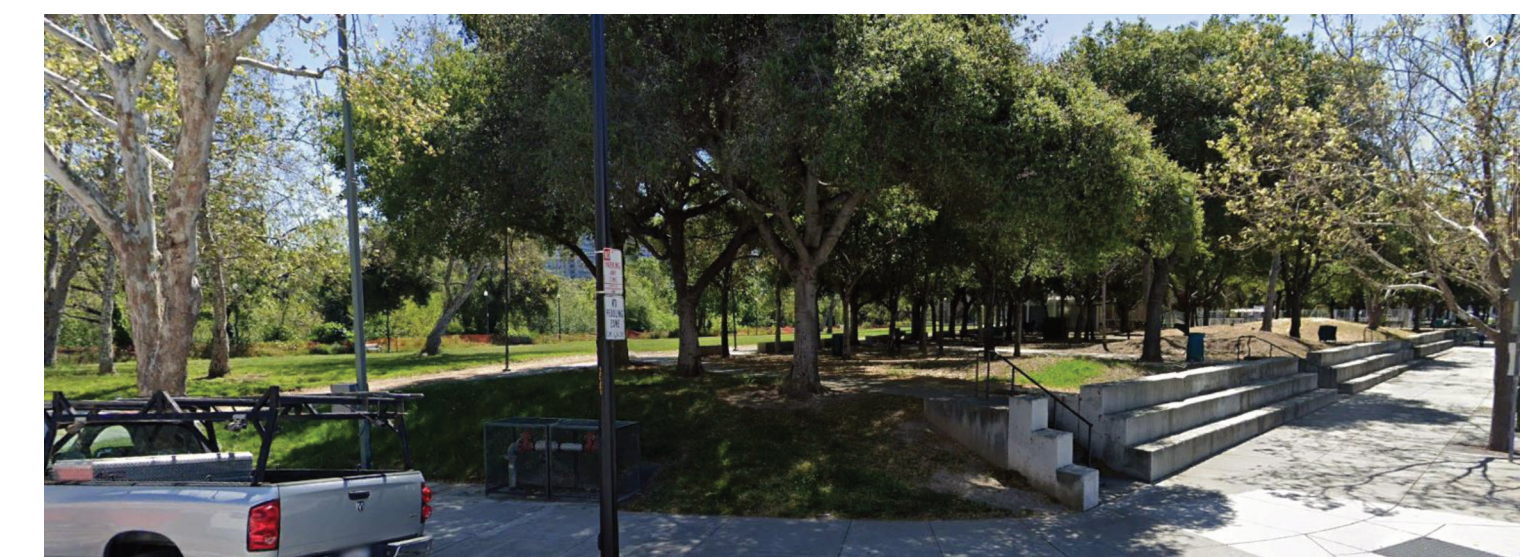
The curve in the sculpture is arrived at as the natural curvature of the plywood substrate under stress, but can be computed using the dimensions above. The join of the curve at the end windows is about 70 degrees. The slope of both the ends and the sides of the building are about 5 degrees.

My preferred location of the Tower would be in the Park by the junction of West St. Johns and N. Autumn. Firstly, there is already step access to the Park here. The orientation would be with the long axis pointing approximately along N. Autumn St.. This allows the building to orientate at 90 degrees to the corner of the Stadium. It has approach aspects from both N Autumn St. and the Park and would give a view from the Observatory Platform of the aircraft landing at the airport whilst conforming to the airport orientation criteria.

The dimensions of the building will allow it to be located within the boundary of the West Side Area of the Competition. Being on the junction of the two roads it will allow uninterrupted access for construction traffic without disturbing the rest of the Park. It is also well away from amenities that cannot be interfered with under the Terms and Conditions.



Above: Placement and orientation.
The red oval is the building.
The white arrow is the orientation to the Airport.
Red line is the 108ft ruler
Yellow line is 60ft ruler.



Left: View of the site facing South

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Design of the Building

The building is intended to follow closely the look and design of the sculpture. However, practical and functional considerations may well require certain modifications.

The Crown, being an open viewing area, would need to be outlined in an open steel structure so there would be views out in all directions. The inner Atrium would likewise be an open steel and glass structure. If thought appropriate, the steel could be outlined in tiny white LEDs - similar to the palm tree avenue to the South.

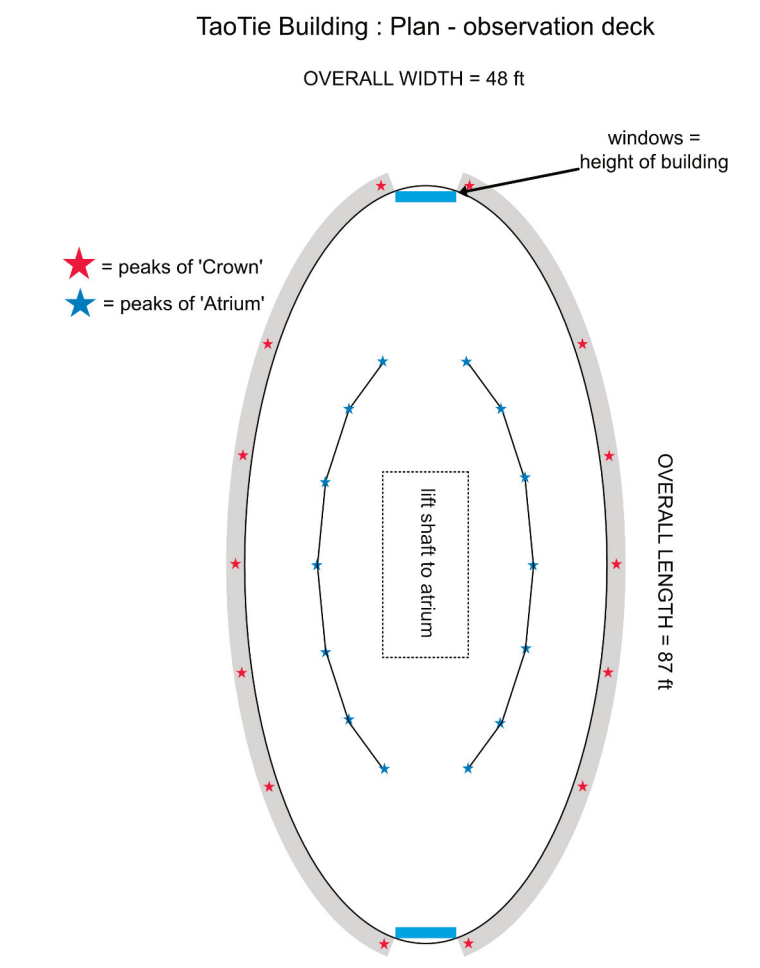
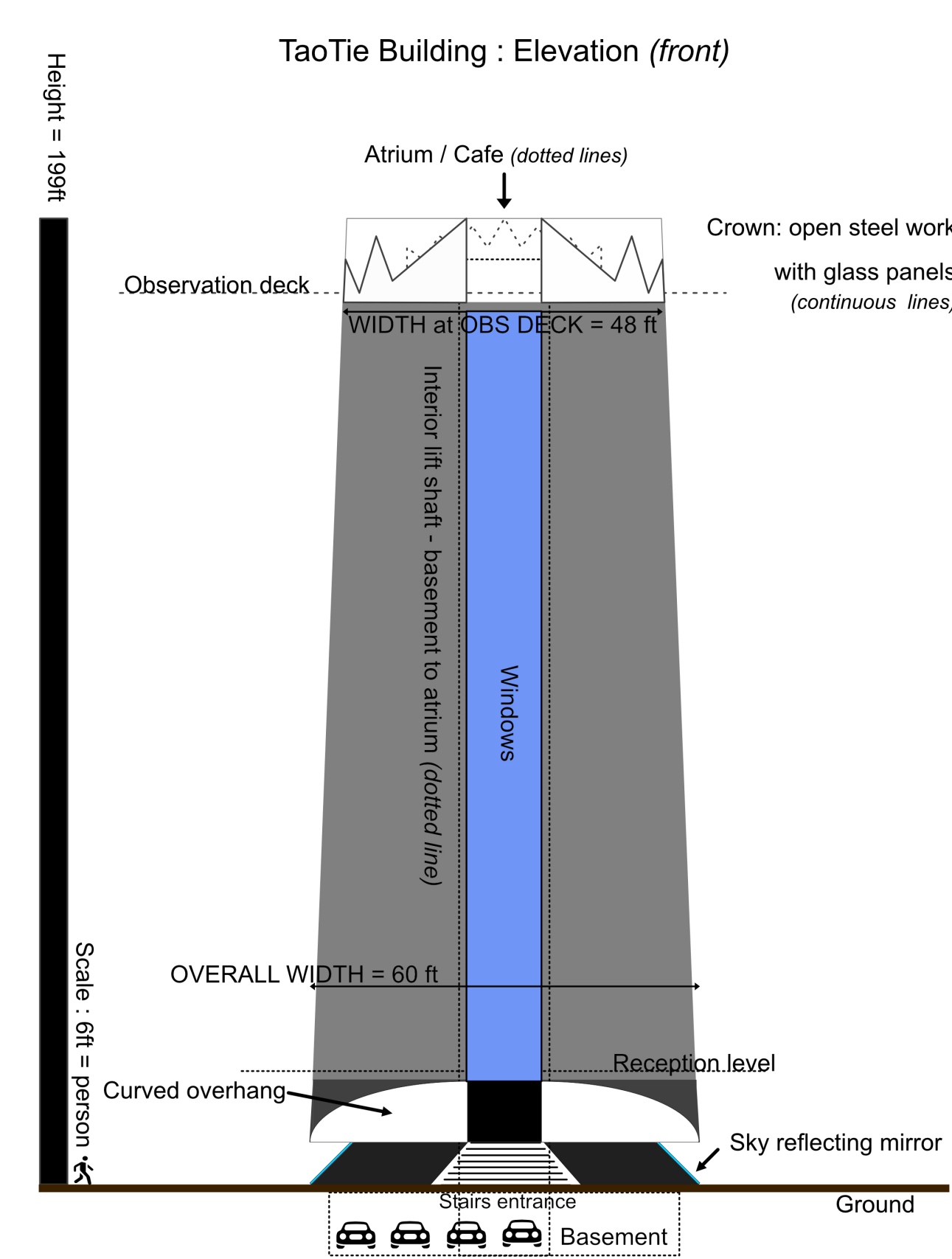
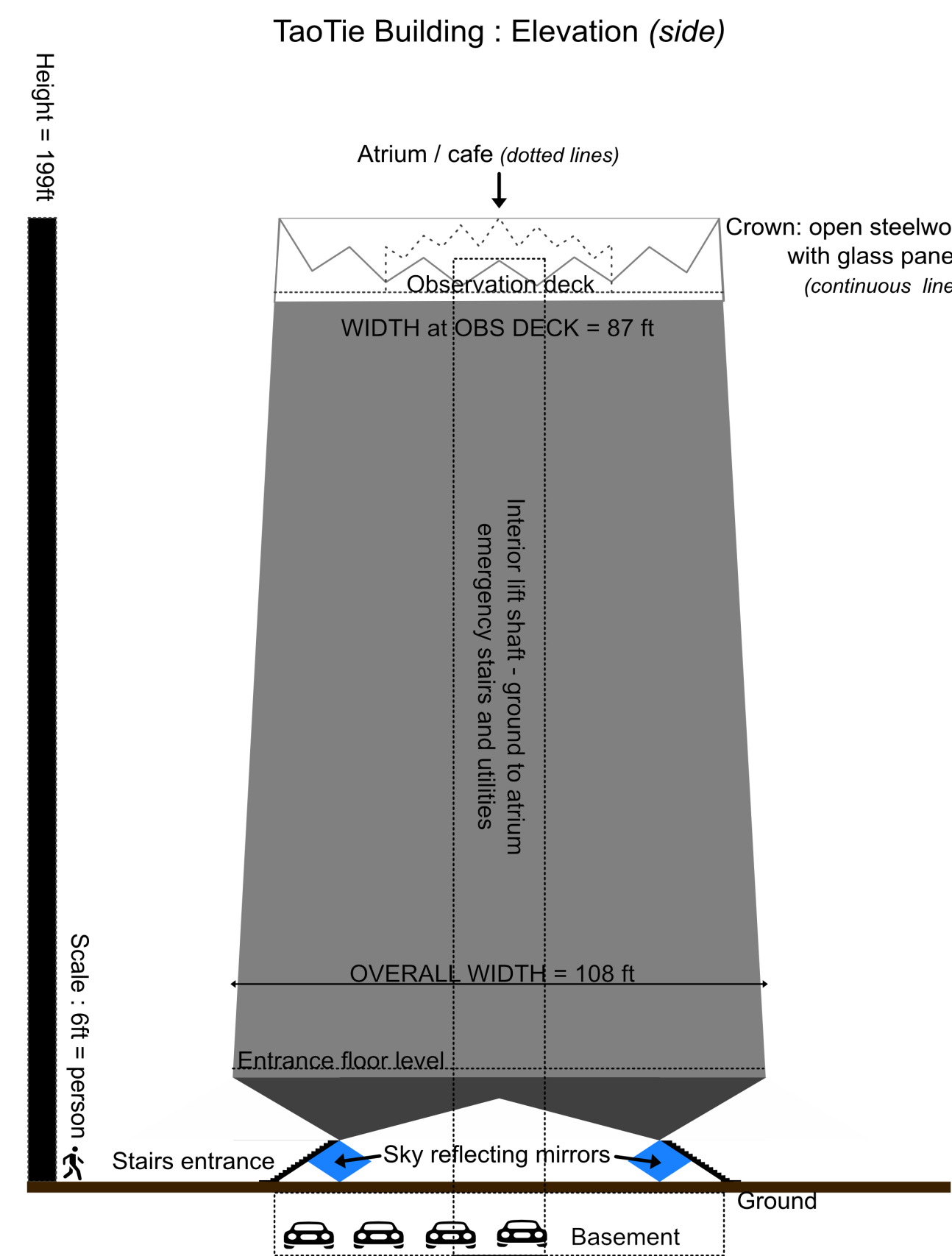
Not all the triangles in the Body tessellation need to function as windows, especially as the building will be a museum with galleries. The front and rear full height windows should be sufficient to light the interior. The triangular windows need not be curved.

It is important that the 'Feet' (blue diamonds in the plans) are allowed to reflect the sky. **The building should look as though it is floating on light.**

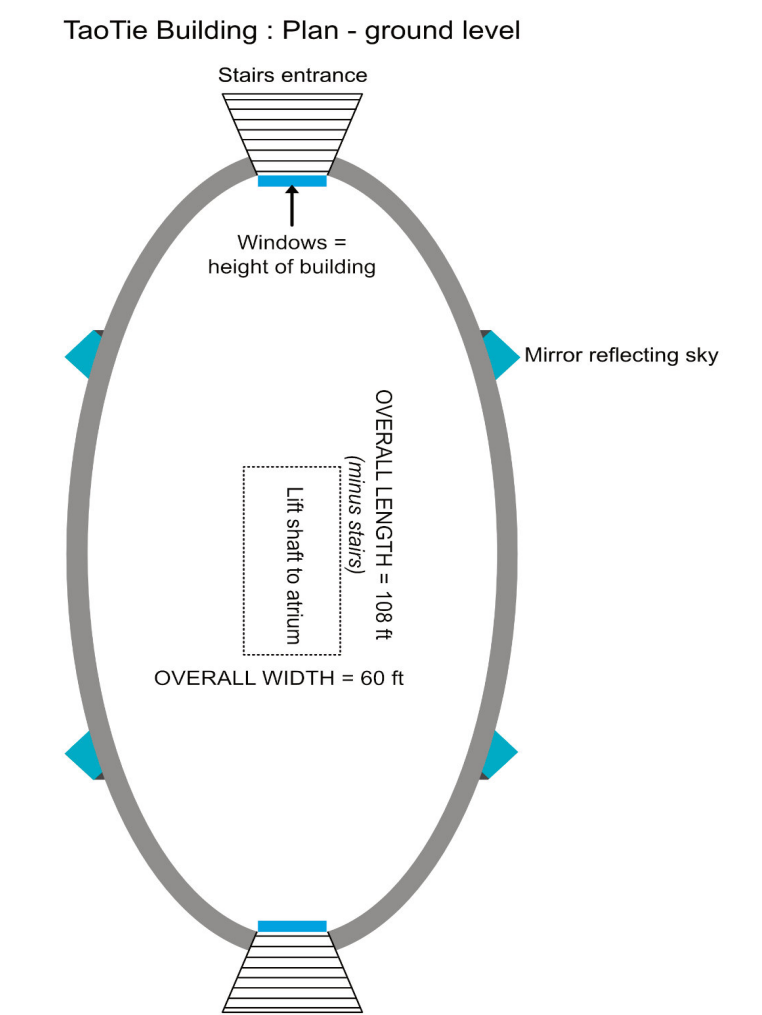
I have left the interior of the building blank (see D3) as it will need to be flexible as to layout. I envisage a double height reception area i.e. 20 ft with the other floors around 10 ft. The central core will contain two lifts that will travel from the Basement to the Atrium, two sets of emergency stairs and all the utilities. Public access stairs would be integrated into the museum interior design and also disabled ramps.

Lighting: There need not be any external lighting for the building to operate. If it thought appropriate there could be modest down lighting extending on armatures projecting from the Crown (West side only) to cast triangular pools of iridescence on the ground.

Although unusual in appearance I believe it can be build using standard techniques.



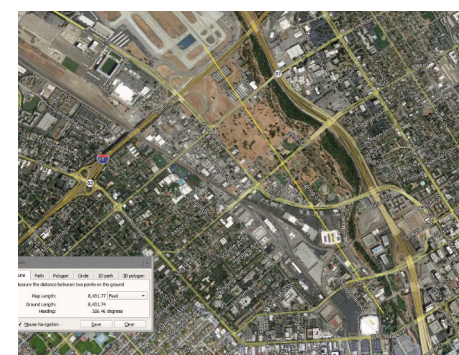
A section of the tessellation on the stainless steel cladding. The colours are intended only to show the way the chevrons fit around the triangles.



Considerations

Aircraft

The site is right underneath the flight path into San Jose Airport. See the orientation map and cockpit view below. The yellow line is the building's orientation



The structure would have a height less than 200 ft to accommodate this restriction. The full height windows at either end could look like a runway (aviation criteria) but with its off-set orientation, this should not be the case. Sun reflections should also not be a problem as the approach is from the South. The tiles would be polished but any mirror-reflectivity will be broken up by the embossed (matt) pattern and tessellation. There would be no up-lighting from the base or observation platform. Light from inside the building would be approximately the same as the surrounding buildings.

Disability

The building would be fully wheelchair accessible via the lifts.

Fire, Earthquake, Wind and Sun

The building will be clad in stainless steel which would be compliant with current cladding restrictions post-Grenfell Tower. Other elements of the building should conform to 'A' grade (or US equivalent) fire resistance.

According to the US Geological Survey, San Jose is in an area prone to substantial earthquakes - the SJ football team is named after this phenomenon! The overall shape of the building (tapering towards the top) should be intrinsically resistant to earthquakes but this could be augmented with damping features in the basement and the central core.

Wind tunnel tests may need to be carried out but the smooth aerofoil shape should mitigate any damaging wind vortices in the surrounding area. There may be some funnelling next to the Arena.

As the building is convex there should be no Sun focussing effects.

Environmental

The building is at the far end of the Park and with access from the street for construction and visitors. As such it should have little impact on the flora and fauna in the rest of the Park - especially that around the confluence of the rivers. Likewise, as the building will only be lit passively or with modest down-lighting on the East (Stadium) side it should have little impact on the river fauna and avian migration. Though metallic and reflective the tiles on the cladding present a convex curved surface minimising light focussing effects. The night-time illumination of the structure on the West (Park) side would be provided by reflections of other buildings, passing cars on the freeway and aircraft coming in to land.

During the morning, the building will cast its shadow onto the Arena. At midday the shadow will be cast forward onto the N. Autumn / W. St Johns intersection. In the evening the shadow from the Arena will fall onto the Park so the building will not add significantly to overshadowing of this area.

The Observation Deck, by its nature would be unlit at night to provide views of the nightscape. The interior of the central Atrium would be modestly lit as you would find in any urban cafe. This would not be visible from the River. During the day the building would operate as a object of light but at night it would look like a section of the starry firmament (see H).

Rainwater can be drained internally from the Observation Deck. This can be stored and used for non-potable purposes.

With average summer temperatures of 27 deg C, I envisage the main problem energy-wise would be keeping the interior cool. The reflective nature of the cladding, along with insulation, should mitigate much of the solar radiation but ambient air temperature will need to be accommodated.

Cooler air from the basement could be drawn up (through rainwater containment tanks?) via the central core (the stack effect) and filtered and distributed in the interior. Some of the iridescent triangles could be interpreted as solar panels to augment the power supply for the interior and exterior lighting. The lifts would need a secure power supply. LEDs should be used throughout.

Some trees will need to be removed and these should be replaced elsewhere in the Park or as part of the landscaping works on the site. Native species.

The site is well served by freeways, streets and parking. However, if it is to be a tourist attraction there will need to be enhanced public transport links. The nearest is the L6 light rail San Fernando station. Both this and the Diridon station are a fair walk away through unprepossessing streets, subways and lots. It would perhaps benefit the project if these route-ways were landscaped or otherwise improved. A river walk along a re-landscaped Los Gatos Creek to the site from San Fernando looks feasible and would pass by the Santa Clara and Delmas bus stop (routes 17,22,68)

The Park

The building will occupy only a small part of the Western Park Area. From the Google Streets photos it looks like the Park is heavily used by families enjoying the picnic areas and shade from the trees. The intention would be to keep as much of this facility as possible.

The Museum

A big part of the project would be the provision of education both locally and to the greater City. There are one or two museums of light around the World (i.e. Mexico City) but these are usually a subsection of a larger institution. San Jose would be unique in having a building that looked from the outside like the concepts that were on display inside. It would not just be 'light' but extended to include all the manifestations of the photon and its place in the history of science and technology.

Money

The design intention would be to facilitate the museum to become self-sustaining financially; as is the case with other museums worldwide. The cafe and the observation deck would be paid access as would special exhibitions. There would be a floor with a library and lecture rooms with the intention of linking to other education establishments in the area. It could also act as a 'repository of expertise' on this topic that could act as a revenue stream deriving from the surrounding technology firms. In this way, what is at first sight a modest project can have a far wider influence than it would at first appear. As this design has a Chinese cultural antecedent it may well appeal to that community in terms of approaches for funding.

A link between the Past and the Future

The old Light Tower was initiated in order to demonstrate the exciting possibilities of the new Electric Age. Although my design deviates from the 'Eiffel Tower aesthetic' of the original, I hope it will encapsulate the inspiration those designers must have felt for the future when theirs was proposed. As in the early 1500s and again in their late 19th Century, we are once more on the brink of a new 'Copernican Revolution'. This project has the potential to revisit that point of intersection; a crossroads where we can reach a new understanding of the true nature of the photonic world.