Christmas Ornament Display Structure

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Retrieved from mystarofbethlehem.com/home

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Overview

- Problem statement
- Final design
- Ornament dimensions
- Individual components
- Considerations
- Project timeline
- Conclusion
- References

Problem Statement

Need: My Star of Bethlehem LLC does not have an aesthetically pleasing way to display their products at multiple venues.

Goal: Design a better way to display the Christmas ornaments of My Star of Bethlehem LLC when marketing their products.

Ornament Dimensions

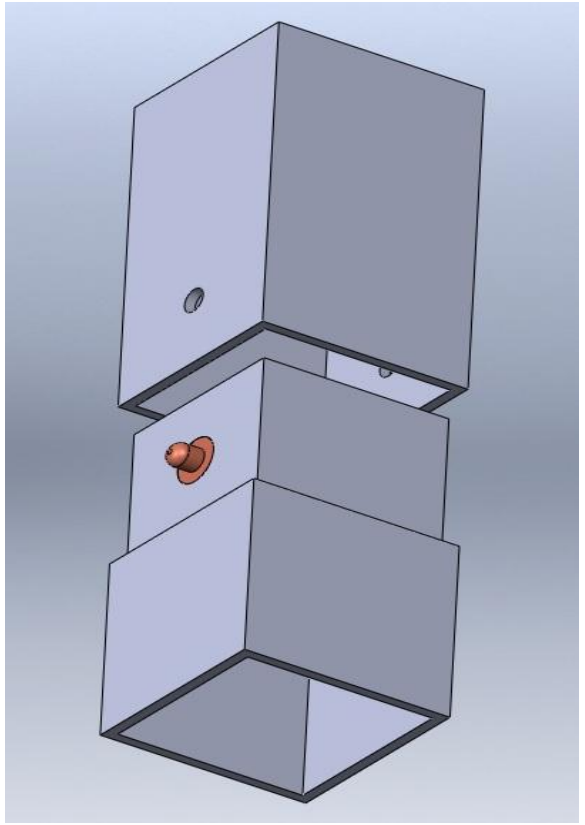
Medium Size (picture)

- 27.5 in = 2.29 ft diameter
- 2.94 lb

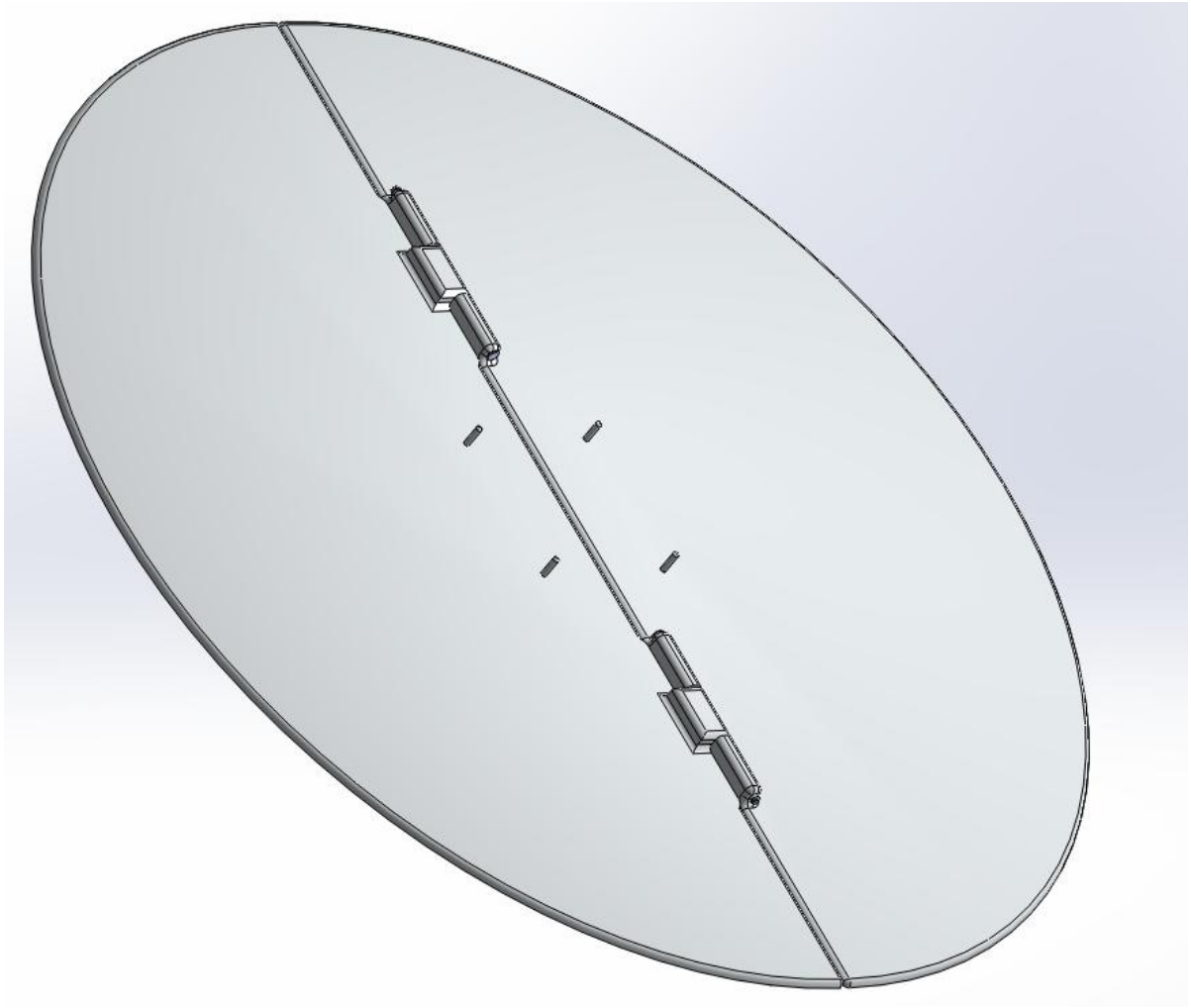
Largest Size

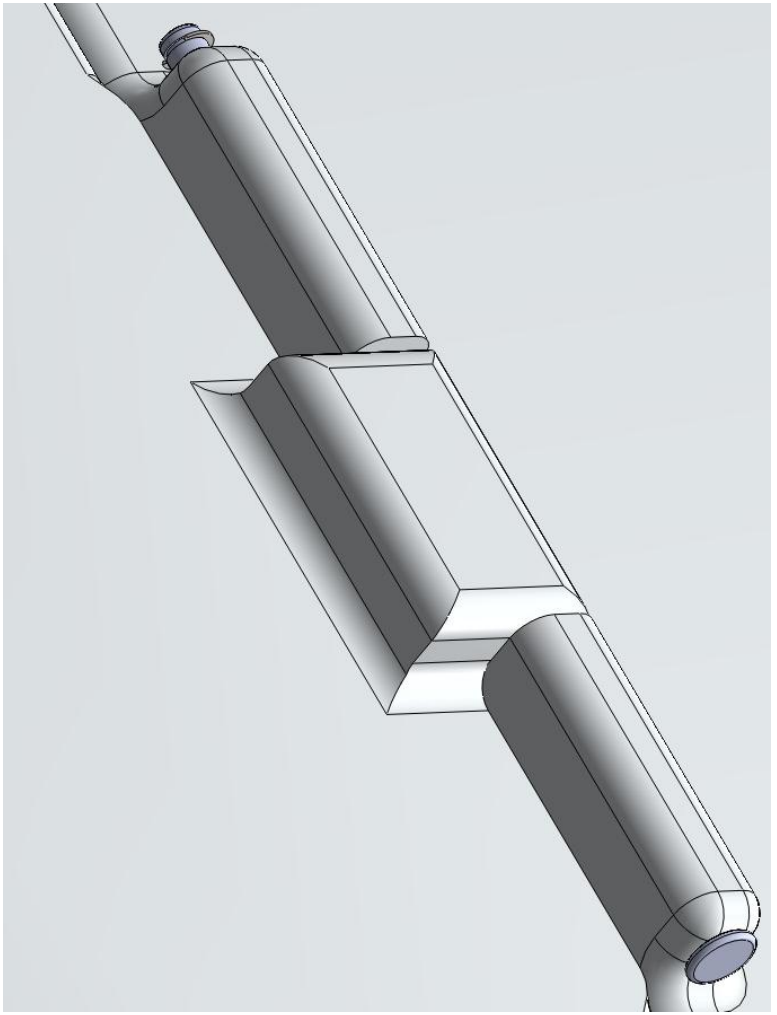
- 51.2 in = 4.27 ft diameter
- 7.19 lb

Final Design - Exploded View

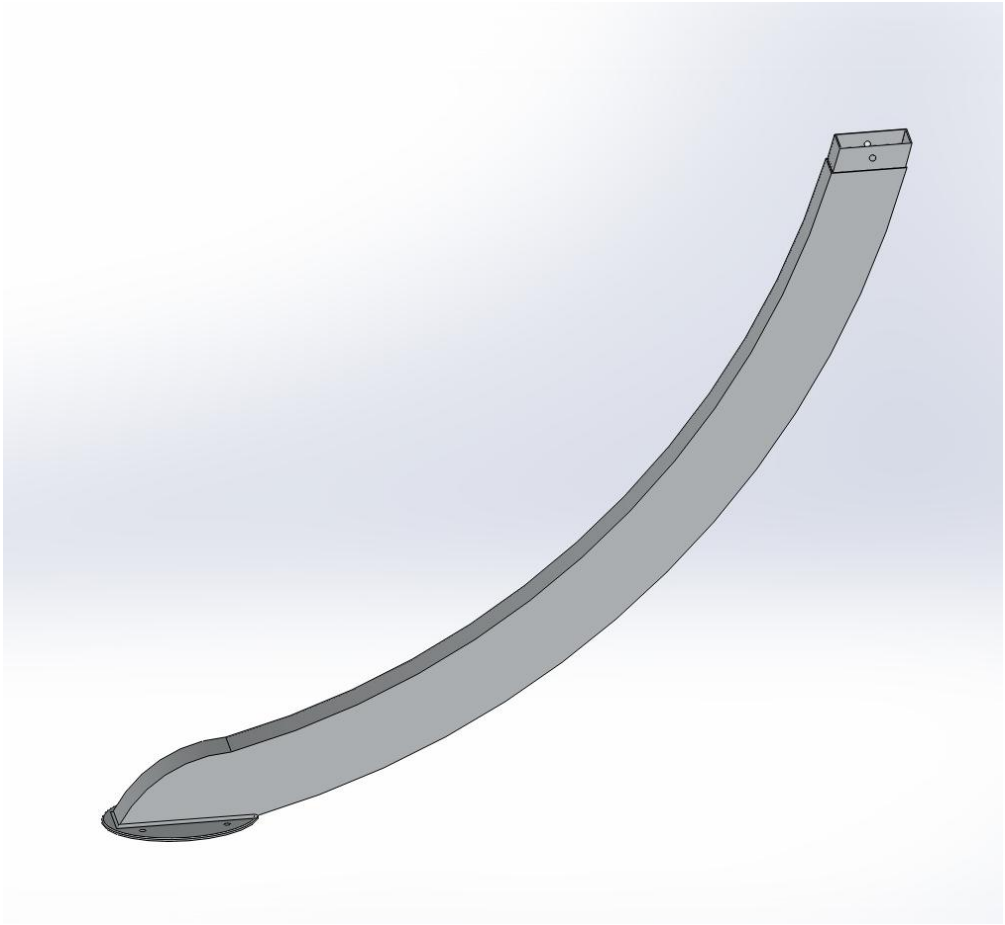


Components Considered: Base

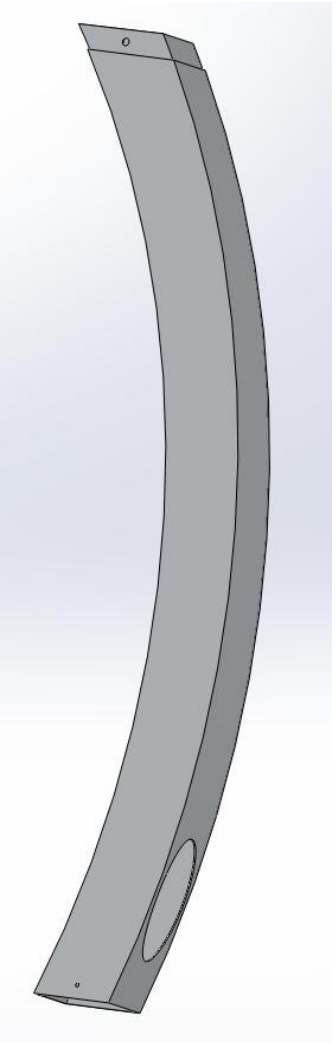




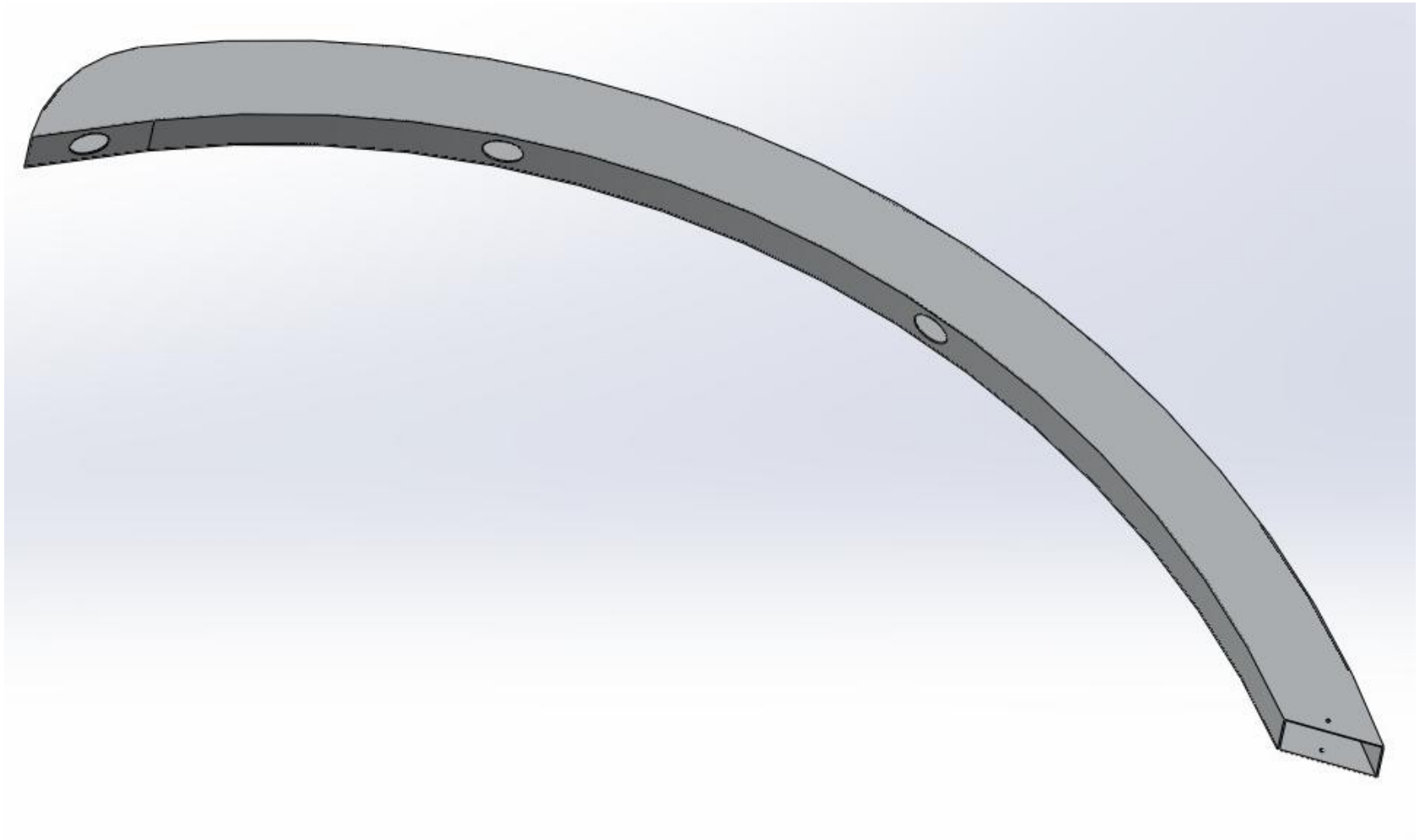
Bottom Arch Section



Middle Arch Section



Top Arch Section



Final Design

Assumptions

- Unidirectional wind flow
- Wind speed will not exceed 50 mph
- The aerodynamic analysis will model the ornament as a sphere
- Ambient temperature will not exceed 100 ˚F
- Maximum of three ornaments displayed at any one time
- Uniform thermal expansion due to uniform material thickness and composition

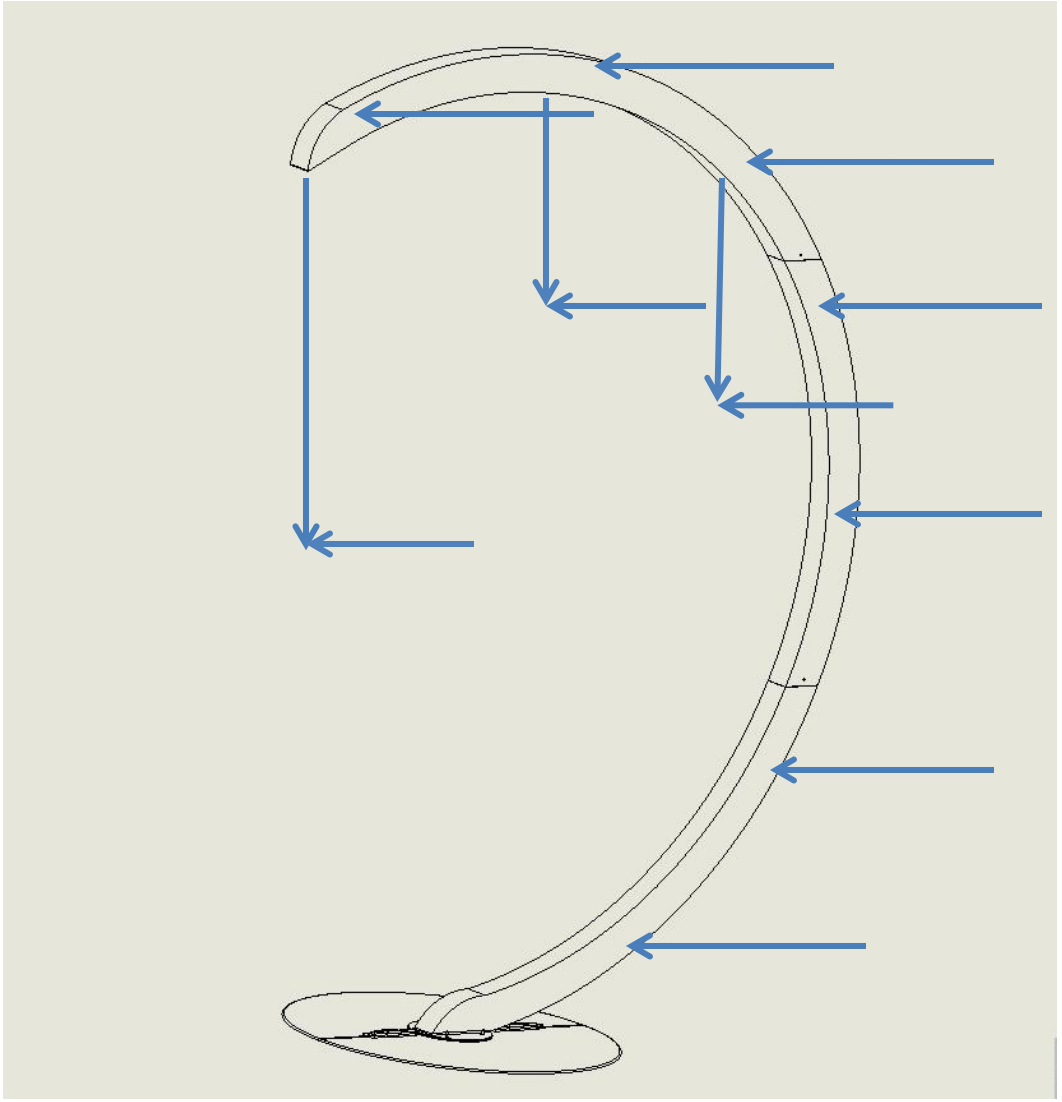
Structural Analysis

Vertical Vectors Represent Forces Due to Gravity

Newton's Second Law is used to evaluate the downward force due to the weight of the ornament

F = m*g

F = Force
m = mass
g = gravitational acceleration



Horizontal vectors represent forces due to wind assuming a maximum wind speed of 50 mph

The equation used to analysis the wind force is:

F = A*P*Cd

F = Force
A = Projected area
P = Wind Pressure
Cd = Drag coefficient

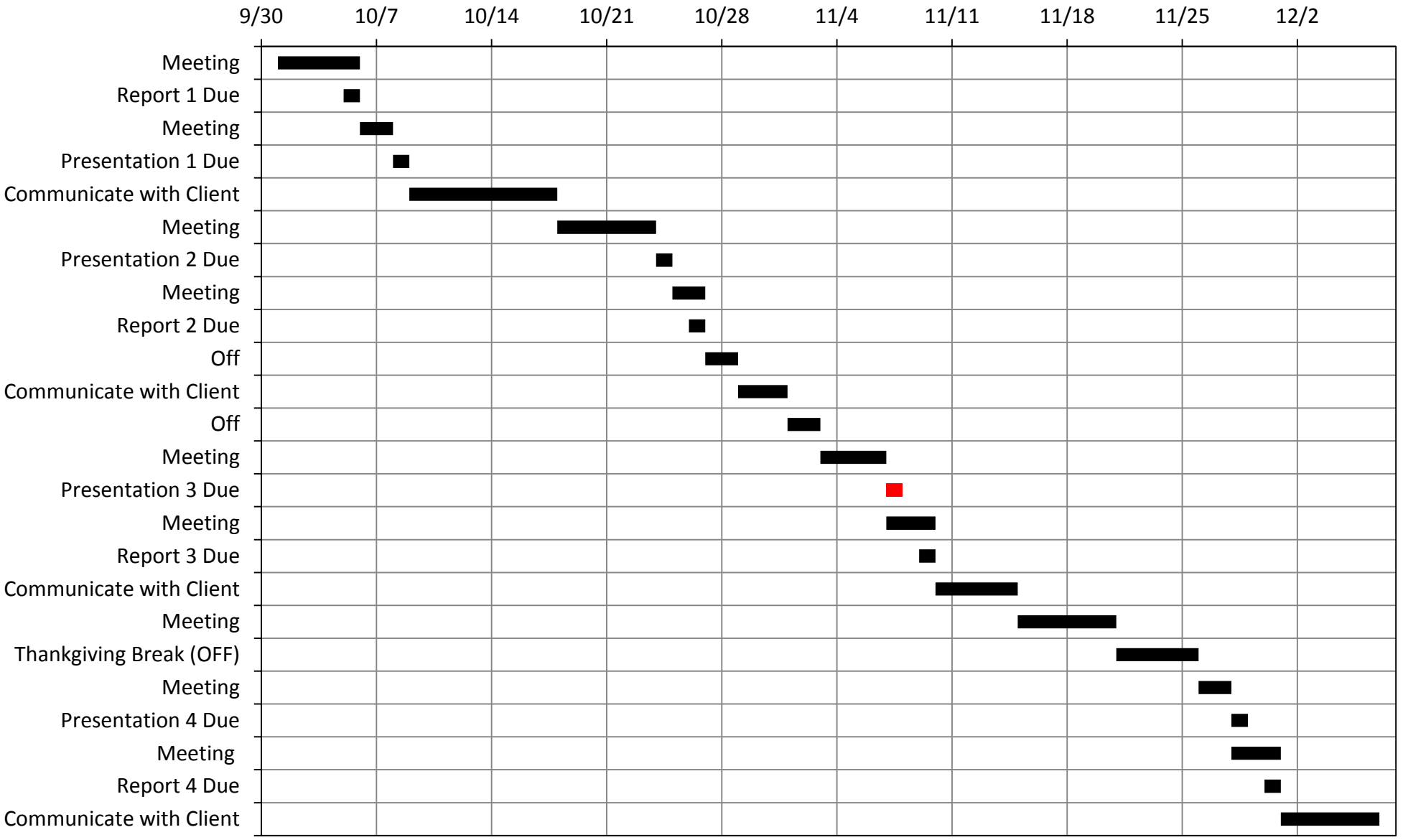
Estimated Costs

Quantity	Item Description	Size (inches)	Price Each ($)	Shipping ($)	Total ($)
2	6063-T52 Aluminum Rectangle Tube	4 x 3 x 1/8 - 96	114.24	3.17	231.65
1	6063-T52 Aluminum Rectangle Tube	4 x 3 x 1/8 - 48	57.12	3.17	60.29
1	6061-T6 Aluminum Plate	36 x 36 x 0.25	199.26	30.39	229.65
					521.59

Considerations

- Specific material
- Number of ornaments
- Weight
- Minimum height
- Ornament display arrangement

Project Timeline



Conclusion

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References

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QUESTIONS?