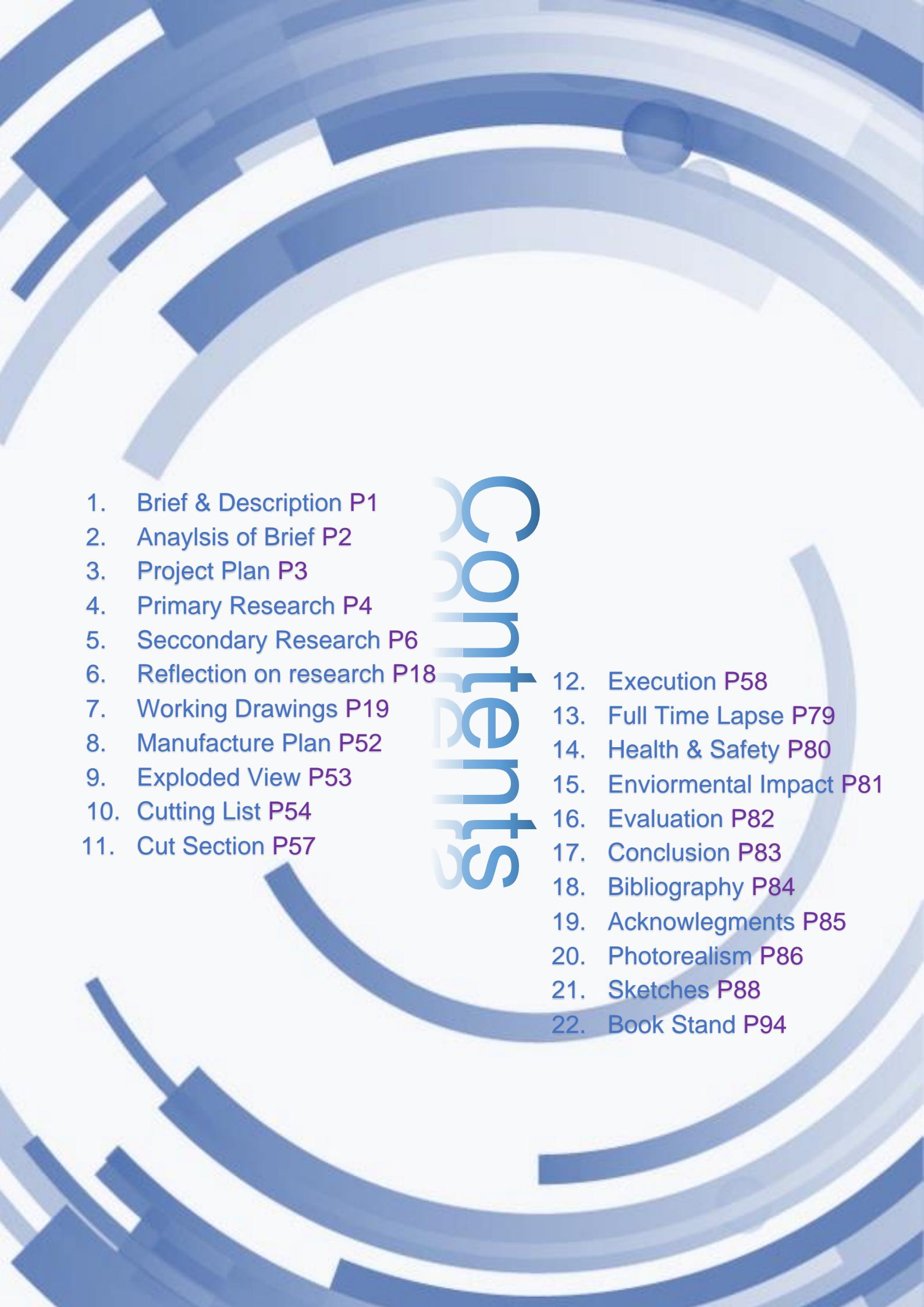


Heritage Model

Alan O'Donnell

Exam No: 114417

- 
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# **Project Description**

- My project is a heritage model of Rathfarnham Castle, located at 153 Rathfarnham Road, Rathfarnham, Dublin 14, D14 F439.
- My aim with this project is to represent Irish heritage in model form, with a reasonable scale and proportions taken during my primary research.
- My model will include a cut section showing the inner details of the staircase within the case.



# **Analysis of Brief**

## ***What Will I focus on?***

- The castle's history
- Its purpose
- Construction methods

## ***What do I want to learn?***

- When it was built
- What is it
- Similar buildings
- How it was built
- What was its purpose
- Historical significance
- Uses today e.g. historians, tours
- Building techniques
- Repairs, how and why

## ***What Will I have to research?***

- Materials
- Techniques
- Workers
- Owner
- Public use

# Project Plan

This Gantt Chart represents how I aim to proceed with my project during the next four months.

Tasks	September	October	November	December
Brief	🟡🟡🟡🟡	🟢🟢🟢🟢	🟢🟢🟢🟢	🟢🟢🟢🟢
Research	🟡🟡🟡🟡	🟡🟡🟡🟡	🟢🟢🟢🟢	🟢🟢🟢🟢
Site Investigation	🟢🟢🟢🟢	🟡🟡🟡🟡	🟡🟡🟡🟡	🟢🟢🟢🟢
Drawings	🟢🟢🟢🟢	🟡🟡🟡🟡	🟡🟡🟡🟡	🟢🟢🟢🟢
Cad Work	🟢🟢🟢🟢	🟡🟡🟡🟡	🟡🟡🟡🟡	🟢🟢🟢🟢
Model Making	🟢🟢🟡🟡	🟡🟡🟡🟡	🟡🟡🟡🟡	🟢🟢🟡🟡
Cutting List	🟢🟢🟡🟡	🟡🟡🟡🟡	🟡🟡🟡🟡	🟢🟢🟡🟡
Manufacture	🟢🟢🟡🟡	🟡🟡🟡🟡	🟡🟡🟡🟡	🟢🟢🟡🟡
Report Writing	🟢🟢🟢🟢	🟡🟡🟡🟡	🟡🟡🟡🟡	🟡🟡🟡🟡
Final Assembly	🟢🟢🟢🟢	🟡🟡🟡🟡	🟡🟡🟡🟡	🟡🟡🟡🟡
Finished	🟢🟢🟢🟢	🟡🟡🟡🟡	🟡🟡🟡🟡	🟡🟡🟡🟡



# Primary Research



On the 1/11/2020, I visited Rathfarnham Castle to refresh and expand my understanding of the castle and its significance. Using my photos, I could approximately estimate the proportions and ratios of the castle.



I got in contact with the receptionist of the castle thanks to my teacher, inquiring about visiting the castle during the Covid-19 Pandemic. They ensured me that I could visit the premises but not go inside, which I have done previously. They also gave me a guidebook and a letter shown below.



**European Union**  
European Regional  
Development Fund



[Primary Investigation](#)

# More Pictures



End Elevation (Right Side)



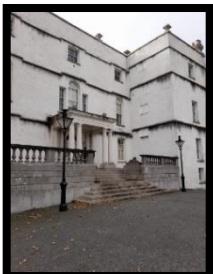
End Elevation (with scenery)



End Elevation (Wheelchair accessibility)



Front Elevation



Isometric (Staircase)



End Elevation (Right Side)



Right Side Garden



Dimetric End View (Left Side)



End Elevation (Left Side)



Isometric Elevation (Left Side)



Back Diametric Elevation



Back Elevation (Back Side)



Back Elevation



Back Perspective Elevation  
(Myself on the left side for scale)



Back Elevation



Back Isometric Elevation

# Secondary Research

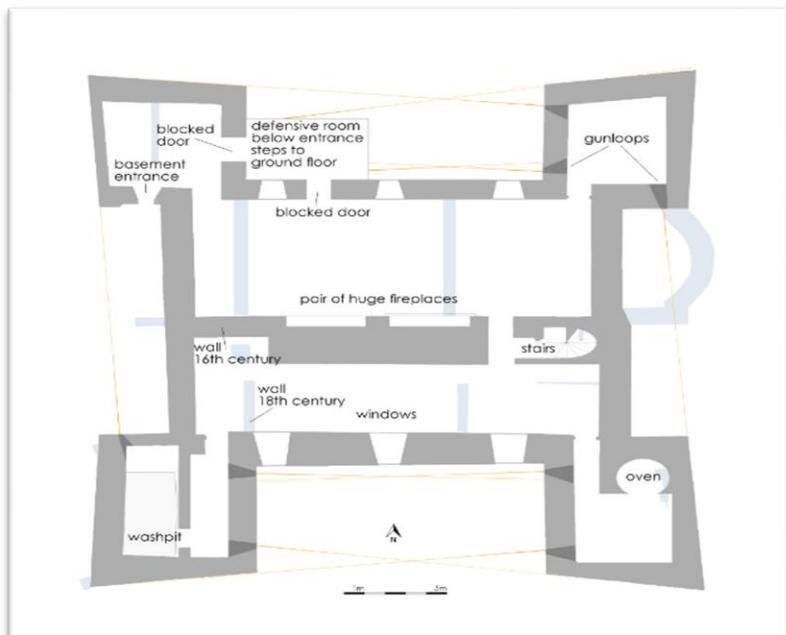
## When was it built?

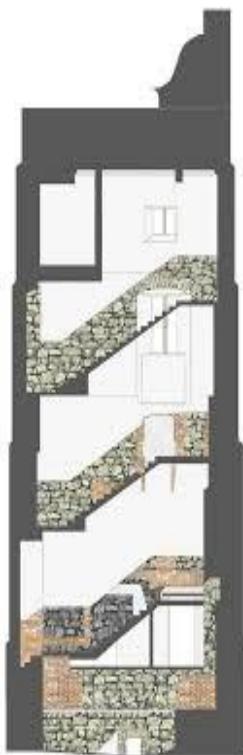
- Rathfarnham Castle was constructed in 1583 for Archbishop Adam Loftus. Sir William Chambers and James Athenian Stuart remodelled it in the eighteenth century. The Castle was renovated in 2015. These works were extended with the find of 17<sup>th</sup> century artefacts. More than 18,000 artefacts were found when implementing a new lift and staircase to the castle.



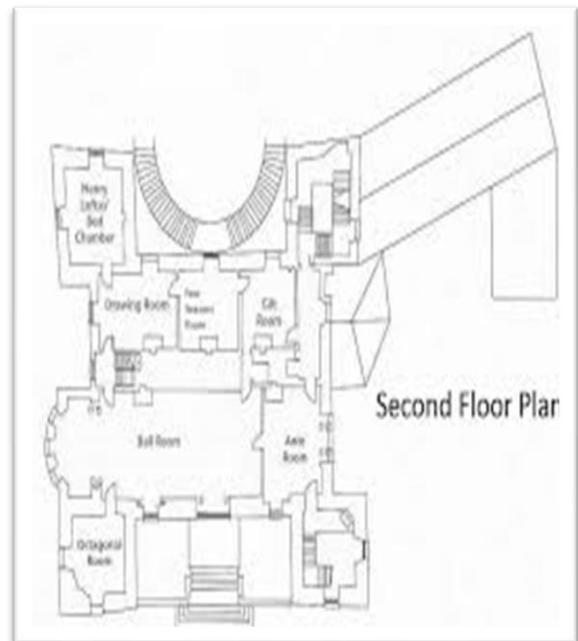
## What is It?

- Rathfarnham Castle is a fortified house. The layout consists of a four-story square building with high projecting towers on each corner. All the walls are all approximately 1.5m thick.





- On the ground level, there are two vaulted apartments, which are divided via a 3m thick wall, which rises to the castle's full height. On the level of the entrance hall lies the 18<sup>th</sup> century reception rooms. On the next floor up is the former ballroom which was then converted into a chapel.



## Similar Building

Manor Houses/ Fortified Houses

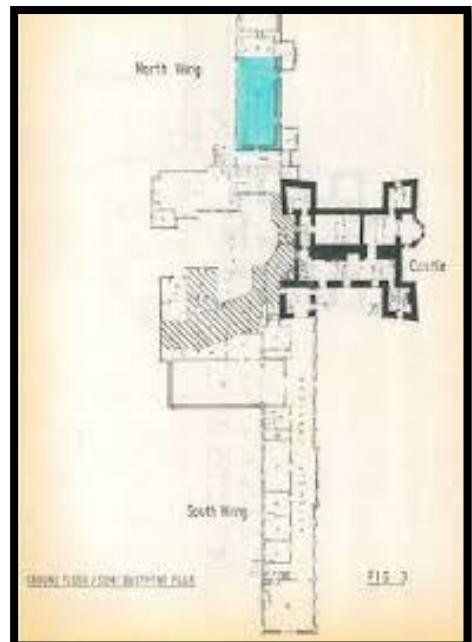
1. Rathfarnham Castle (1583)
2. Marley-Park House (1794)
3. St Enda's Park House (1780)
4. Thorne mead Castle (1805)



[Manor House](#)

# What was its purpose?

- Rathfarnham Castles purpose has changed from a place of safety and security during several wars to now a place of historical importance used for research and understanding.



# Historical Significance

- Rathfarnham Castle has had a major role in Irish History these events include:
  - Nine Years War – attack by Wicklow Clan
  - English Civil War – Several Attacks
  - Eighteenth Century – Converted from Medieval to Georgian
  - Nineteenth century- was used for Dairy Farming



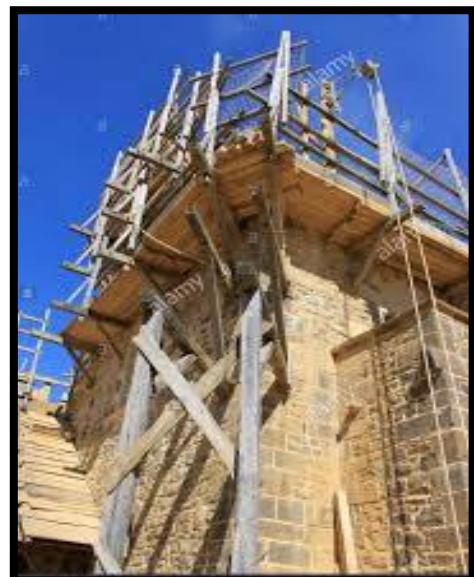
## How it was built?

- Rathfarnham Castle was built in 1583 using sandstone. The build took two years to complete. We can date the fortified house due to the wooden beams used in the roof with dendrochronology.
- A fortified house is the compromise of a military castle and a manor/country house.



[Vintage Photo](#)

- Castles that were constructed in the past followed a similar process. The workers would use horse-drawn wagons to haul the stones from the local quarry in this case sandstone, to the building site. Stonemasons were used to chisel the raw sandstone into blocks. Workers then use man powered cranes/poles to lift up finished stone blocks onto a makeshift scaffold that rested on the castle walls. Other workers would then make mortar on site from lime, soil and water.



[Scaffolding](#)

- Back then, the equivalent of having a foundation was digging a trench to bedrock for the walls to have a solid foundation.



[Trenches](#)

- Back then they didn't have insulation like we do today. However, they did have their own solution. They had heavy woven tapestries, on chamber walls, which were decorative but also acted as insulation. They would heat the stones in the chamber and direct the smoke away from the room to keep the heat in but not cause people to chock on caught up steam.



## Alterations

- During the eighteenth century, alterations were made to the first floor. In the sixteenth century, the first floor was arranged with a great hall alongside service rooms.

# Historical Notes – Rooms

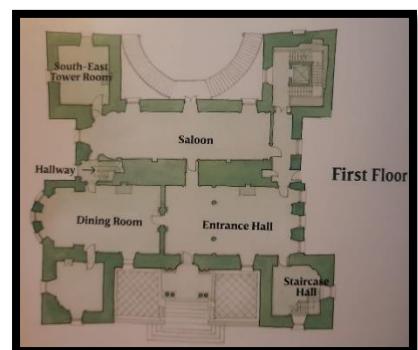
## Basement Floor

- The basement floor was where you would find the kitchens, cellars and food storage. Later, further staff rooms would have been implemented. They would have entered through the west side door. There was also an archway that led to the courtyard to find the brew house, washhouse and granaries.



## First Floor

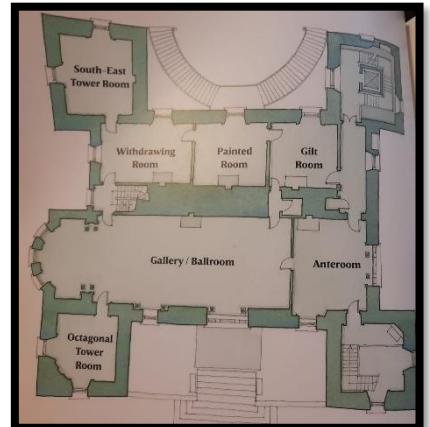
- **Entrance Hall** – remodel in the nineteenth century, kept classical Greek style.
  - Leads into the dining room
- **Dining Room** – Contains columns and pediments along with oval decor plaques that display famous artists and poets, for example Dante Alighieri, Francesco Petrarch and Michelangelo. They later replaced the wooden carved fireplace with a grand marble one.
  - Formally, a part of Adam Loftus' great hall in his sixteenth century house, which was extended with the curved feature on the east bay, then decorated in the Rococo Style.
  - From this image we can see that wooden panelling (boiseries) were used on the walls which were then upgraded in the future
- **Saloon** – Earliest example of Greek style seen in Ireland.
  - The doors were made from mahogany with the use of curved, elegant carvings around the door itself.
  - There are also a series of panels displaying the life of Jesus Christ, painted by Patrick Tuohy, replacing the original panels of Homer's tale of the nymph Calypso and Telemachus, the son of Odysseus, made by Angelica Kauffmann, which was then sold in 1913.
- **SE Tower Room** – Used as a parlour / family dining room.
- **The Hallway** – Goes from the garden all the way through the house up to the roof. A similar styled staircase can be seen in the casino designed by William Chambers in Marino.
- **Staircase** – Displayed in my cut section



Floor Plan

## Second Floor

- **Anteroom** – Guests congregate here before heading into the ballroom,
  - Contains a Venetian Window along with columns and pilasters.
- **Gallery/Ballroom** – Largest room, used for entertainment
  - Decorated by William Chambers. The ceiling was decorated using guilloche ornaments. The north wall contains round headed windows.
- **Withdrawing room** – Displays Rococo Plasterwork
  - Contains a Venetian window along with columns and pilasters.
- **Painted Room** - Contains a polychromatic decorative scheme
  - Features James Athenian Stuarts Designs
- **Gilt Room** – Design is based off Roman and Greek classical architecture
  - Also features James Athenian Stuarts Work
- **Octagonal Tower Room** - Contains a strong masculine decoration
  - Used by James Athenian Stuart and William Chambers.
- **SE Tower Room** – Used as a bedroom by Henry Loftus



Floor Plan (2)



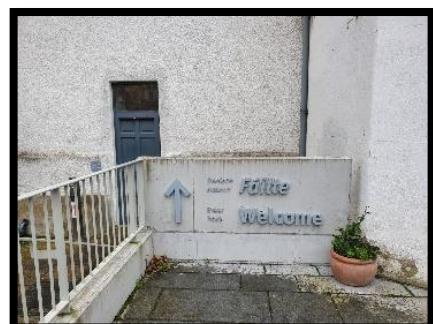
# Uses Today

- The grounds have been split up into housing, a golf club, and the castle, giving people more access to housing and activities to participate in which helped built up Rathfarnham as a society in Dublin.
- The castle is used by historians for research.
- Tours are given to the public
- There is a coffee Shop on site.



[Interior](#)

- A playground has been constructed beside it for children to enjoy. Which is a great addition for the community giving the locals new commodities that support better mental and physical health



[Tour Office](#)



[Playground](#)



[Coffee Shop](#)



[Golf Club](#)

# Repairs, Renovations and Conversions

- A medieval conversion in 1771 to a Georgian Mansion by Sir William Chambers and James Athenian Stuart.
- A new Roman Triumphal Arch, which can be seen from Dodder Park Road.



- The castle's mullioned windows were enlarged, and the battlements were replaced by a coping with ornament urns.

- Also, a semi-circular extension was added to the east side, with an entrance porch approaching the steps on the north. The interior was based off leading artist Angelica Kauffman.



- In 1922 a long-vaulted chamber known as Cromwell's Court was constructed on the north side of the castle, it is used as a storehouse with 1.5m thick walls with a secondary function of a retreat house, which was concealed on the outside using cement plaster.
- Near the golf club, a stone brick temple was a relic of Lord Ely, which was restored, and later demolished in 1979.
- In 2015, there were renovations for a new stairs and lift.

# What Will I have to research?

## Materials

- The Castle was first constructed in 1583. Mainly constructed out of Sandstone blocks. Due to the local quarries making it easy and quick to transport the sandstone to the site.

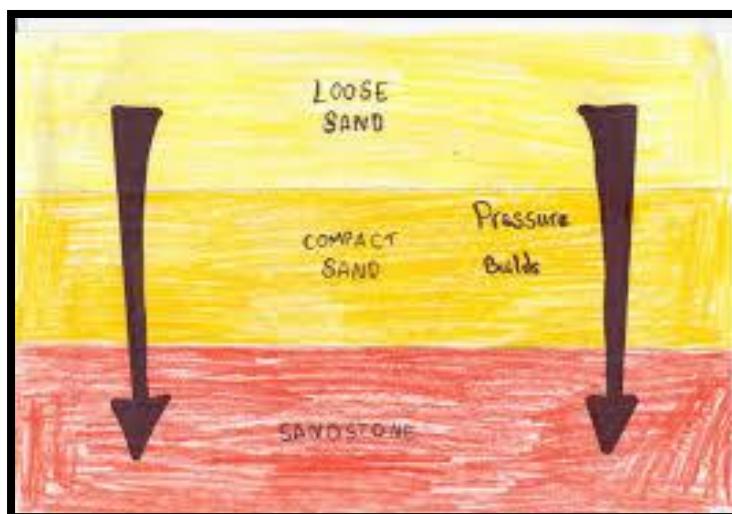


- In the 21<sup>st</sup> century, we would use trucks and lorries to transport limestone. However, back in the 16<sup>th</sup> century they would have used a cart with an animal pulling it likely a horse. Alternatively, by just manpower. Sandstone was a very popular building material in ancient times as due to its relatively soft surface it was easy to carve. It is resistant to weathering yet easy to work with making it an ideal resource when constructing a castle.



Cart

- The downside to sandstone is that it is not the most versatile material due to the original bedding process.



Sandstone Formation

## Techniques

- Sandstone is a great natural resource for building with as it is very durable. However, there are certain building techniques that are needed to work with it. Sandstone can be broken easily with most hand tools for shaping.
- The downside being they can also crumble. This is due to oxidation overtime, which causes the surface of the stone to turn orange. The outer layer then becomes brittle overtime and easily breaks apart.



- To prevent this, a binding agent is required, depending on the country's climate. This agent would penetrate exterior layer and fill in gaps.

# Ownership

- The castle has had multiple owners over its 500-year existence.  
These include:
  - Archbishop Adam Loftus. (1583)
  - Adam Loftus Son Dudley.
  - Dudley's son Adam (1616).
  - English Royalist Troops (1641- 1647).
  - English Parliament and Parliamentary Troops (1647-1649).
  - Oliver Cromwell (after battle of Rathmines (1649)).
  - Adam Loftus (until his death in 1651).
  - Loftus family (1659 after English Civil War).
  - Dr Dudley Loftus great grandson of Archbishop Loftus.
  - Philip Wharton.
  - William Connolly payed £62,000 (1723).
  - Dr Hoadly, Archbishop of Armagh (1742-46).
  - Dr Hoadly's Son Bellingham Boyle (1746-1767).
  - Nicholas Hume-Loftus, 2<sup>nd</sup> Earl of Ely, descendant of Adam Loftus (1767).
  - Hon Henry Loftus (1771) Medieval to Georgian Conversion.
  - Tottenham became Marquis of Ely, voted in by the Union.
  - Estate leased to Ropers in 1812. The lands 300 acres were used for dairy farming.
  - The Lord Chancellor and Francis Blackburne bought the estate in 1852, stayed for three generations.
  - Property Developers Bailey and Gibson acquired the castle in 1912 and divided up the estate.
  - The Jesuit Order bought the South-western Estate in 1913.
  - Father O'Leary constructed a seismograph.
  - The Jesuit Order sold the Castle in 1986, removed the stain glass windows when leaving which were made by Harry Clarke, which were then donated to Tullamore Catholic Church, which was destroyed by a fire in 1983.



## Public use

- 1912 – The eastern side of the grounds became the Castle Golf Club.
- 1912 – The northern west side of the grounds was used for housing.
- Tours are provided to the public, which can be very beneficial to historians and their studies.
- The tours also bring money to the local economy and helps Irish tourism, which makes €5.6 billion euro each year. This figure then rises to 7.3billion when considering fare receipts to Irish carriers.

## My Project

- For my project, I am planning on making a small model of the Rathfarnham castle, with a cut section of the inner staircase, showing off the stone workings and stairs.

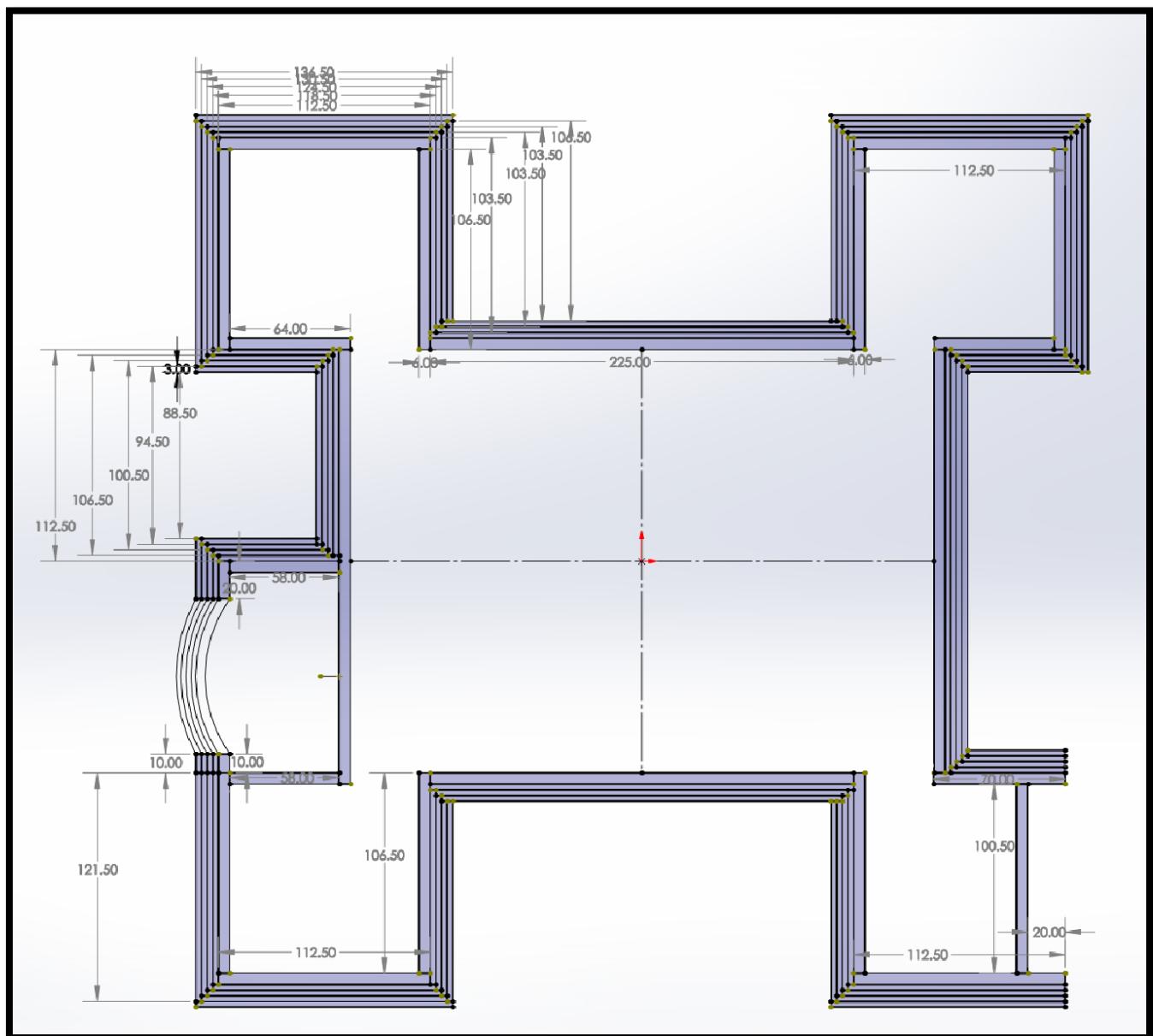


Cut Section

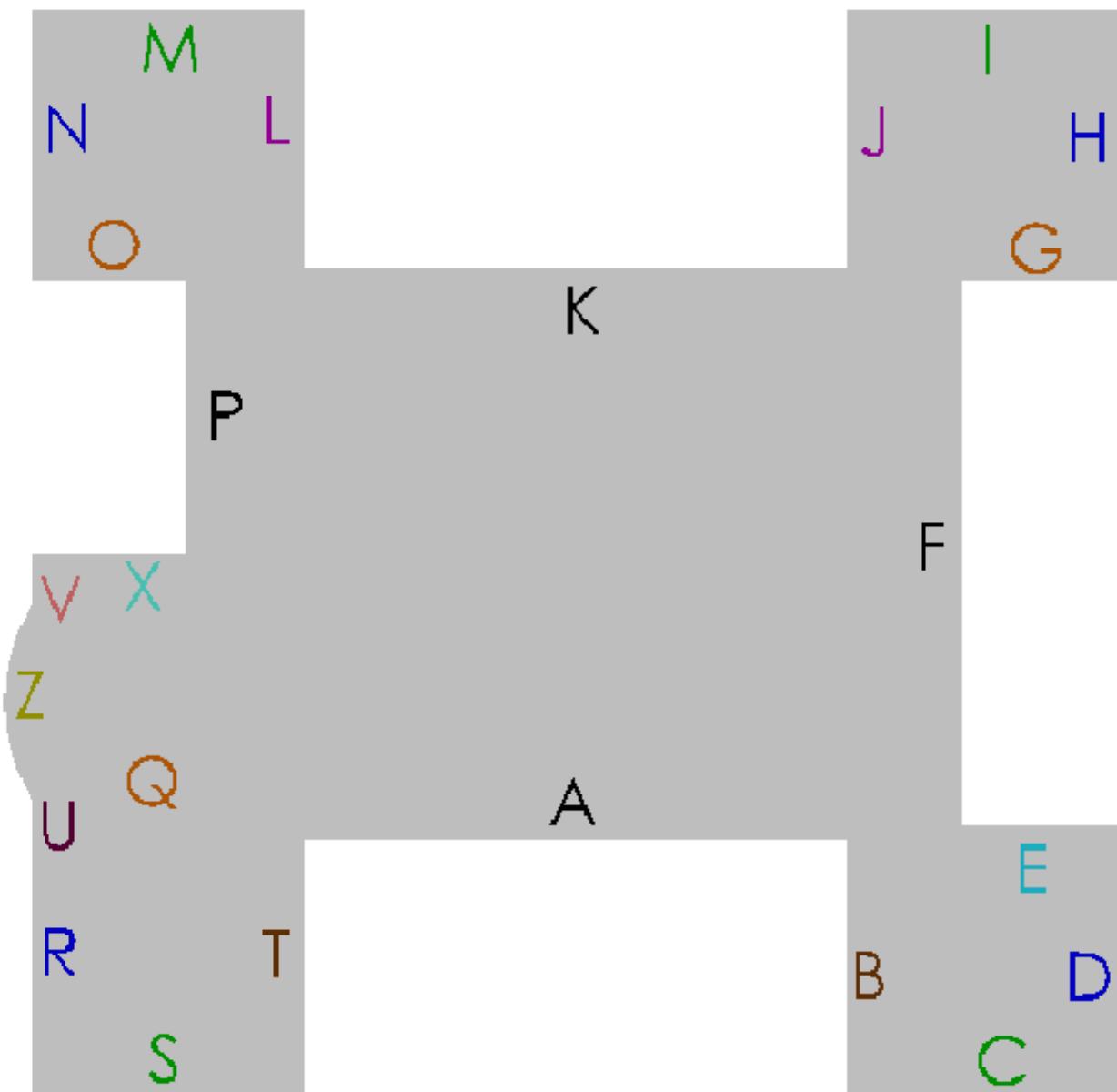
## Reflection on research

- My visit to Rathfarnham Castle gave me a great recollection into the aspects, proportions, and features of the heritage site.
- I found it quite difficult to find information on how it was fully constructed due to its age, being constructed back in 1500s. I wasn't able to obtain much in terms of site drawings/ blue prints, but made use of what was available.
- After investigating the site, I knew how I wanted my final model to look like.

# Working Drawings



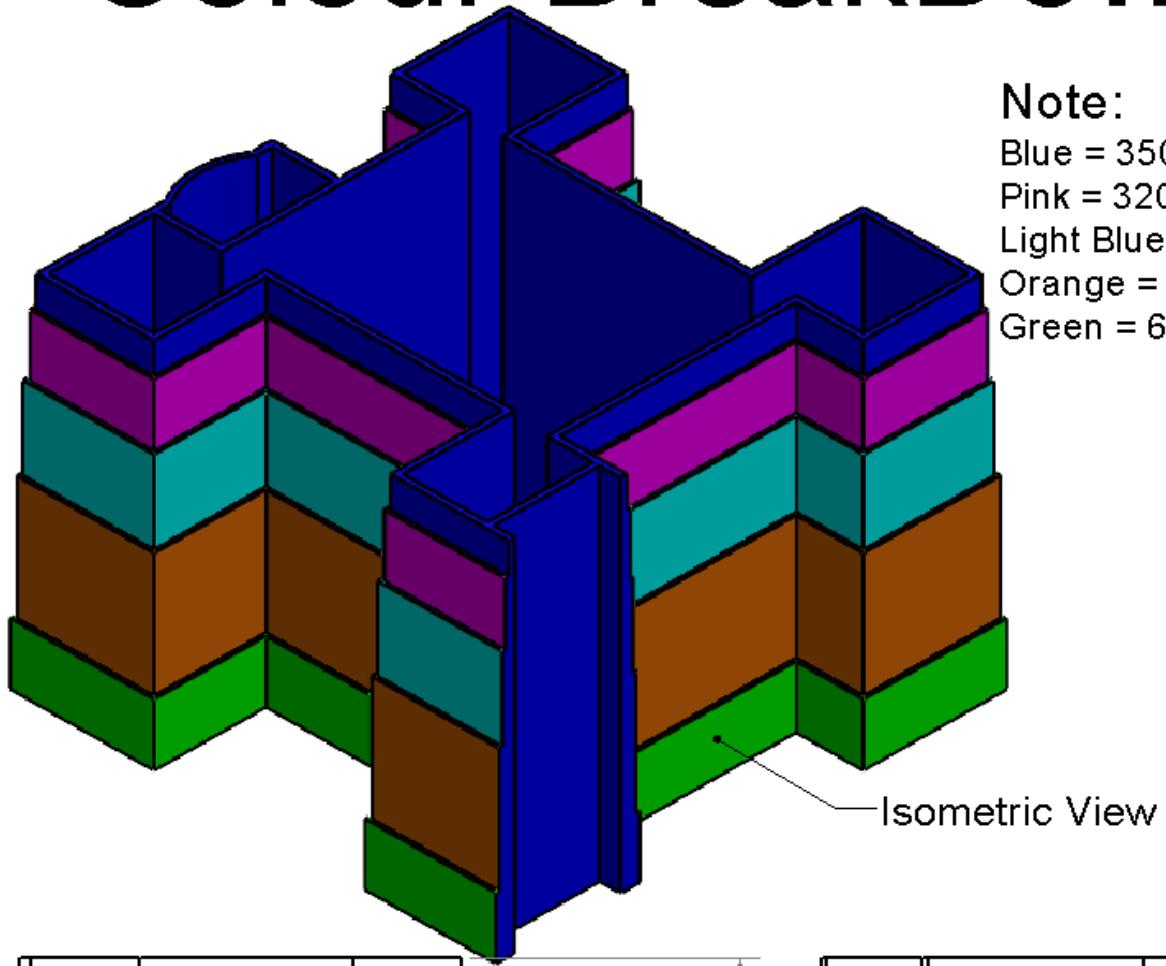
# Top View Part Key



Note:

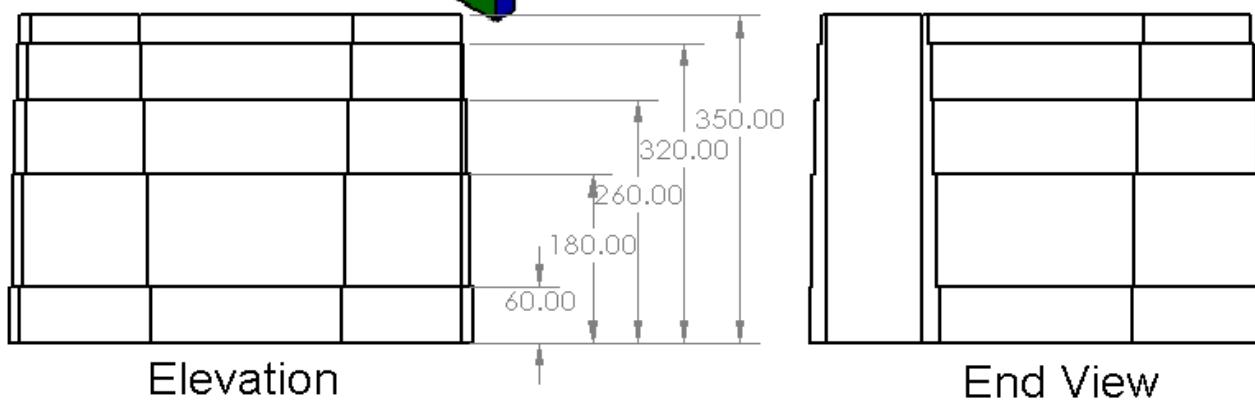
1. Colour code corresponds to same sized pieces.

# Colour BreakDown



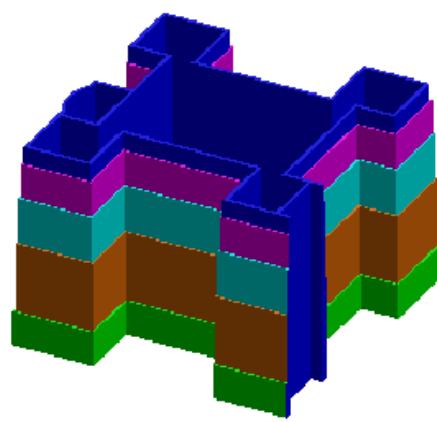
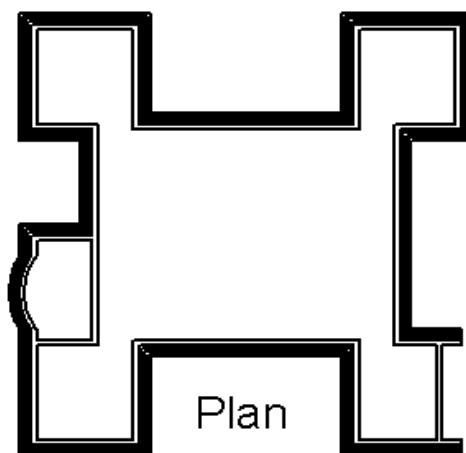
## Note:

Blue = 350mm  
Pink = 320mm  
Light Blue = 260mm  
Orange = 180mm  
Green = 60mm

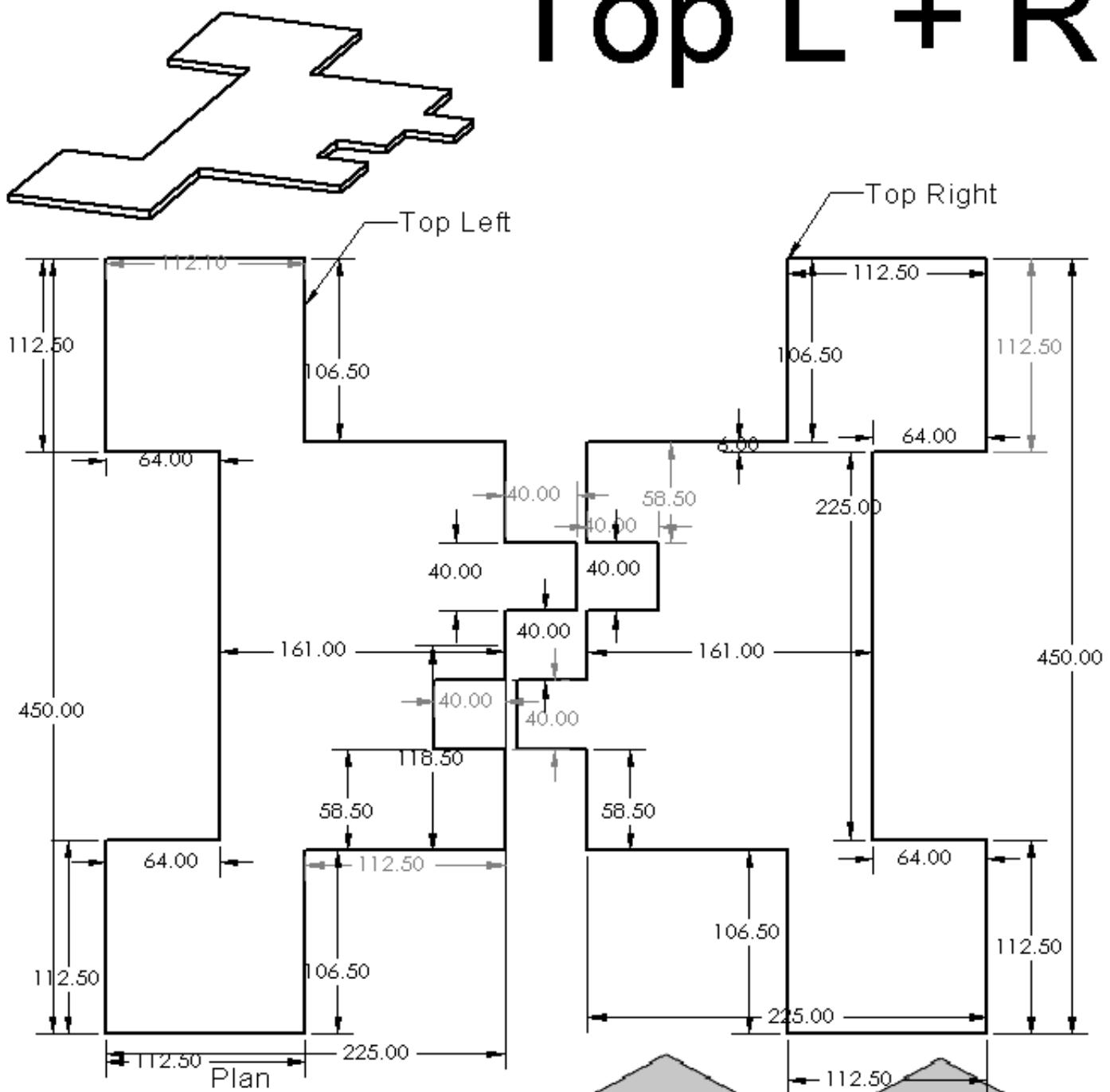


Elevation

End View

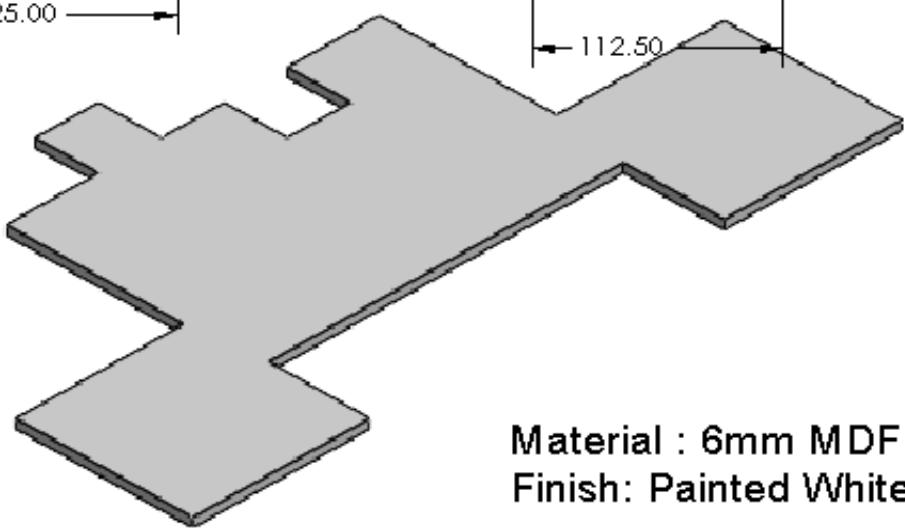


# Top L + R



## Parts Included:

1. Top Left (6mm)
2. Top Right (6mm)



Material : 6mm MDF  
Finish: Painted White

A

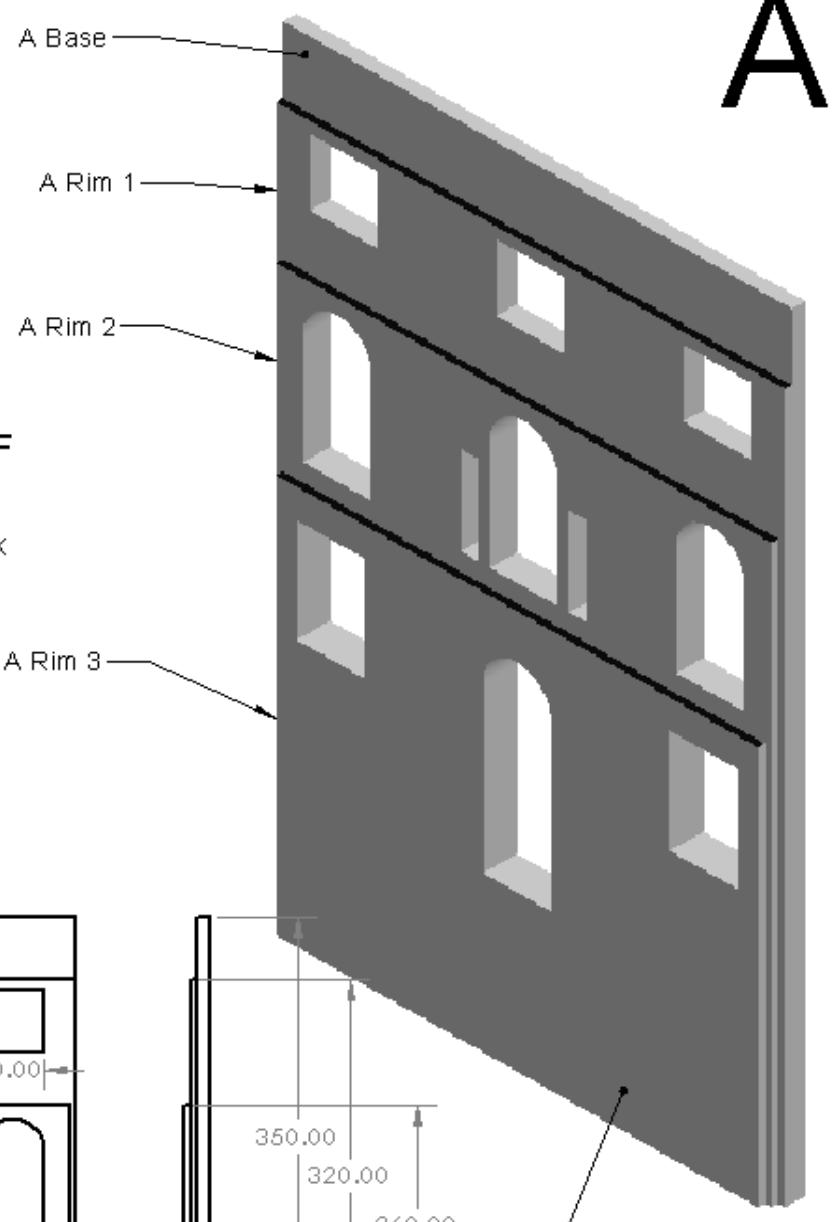
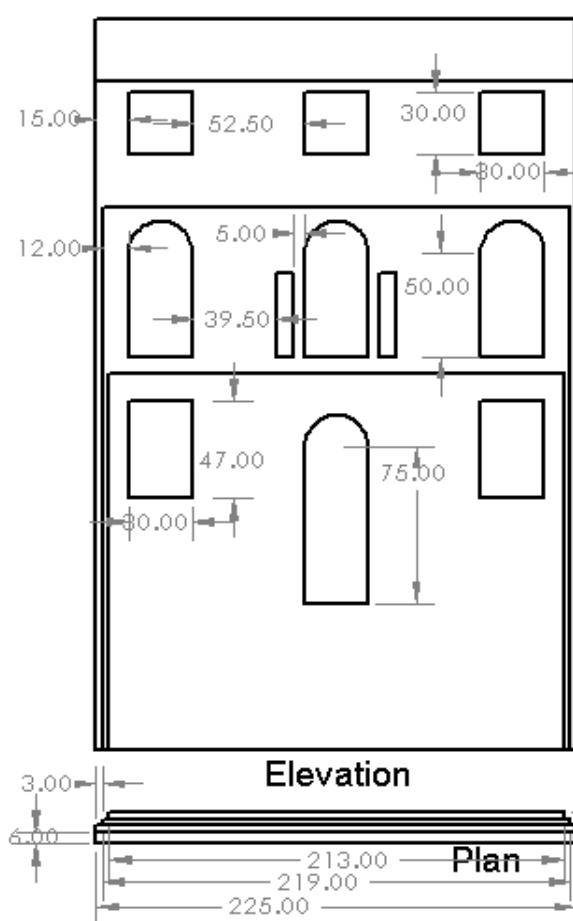
## Parts Included:

1. A Base (6mm)
2. A Rim 1 (3mm)
3. A Rim 2 (3mm)
4. A Rim 3 (3mm)

Material : 6mm + 3mm MDF

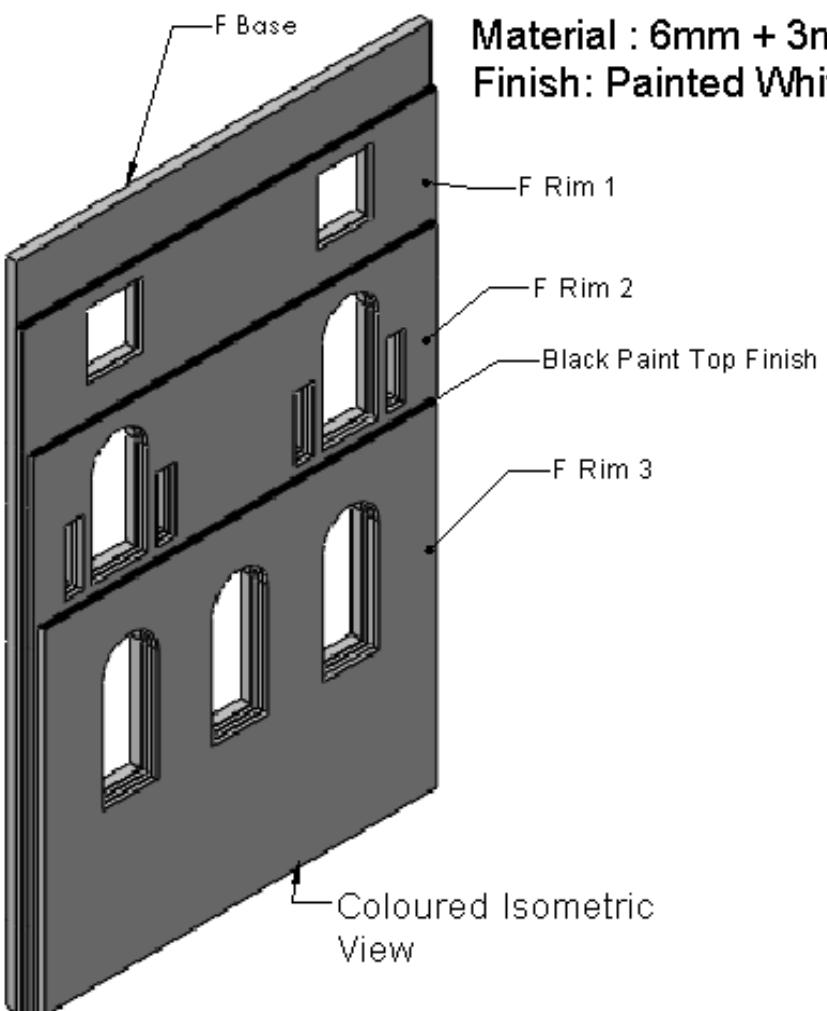
Finish: Painted White

2. Top Profiles Painted Black



Isometric View

Side View

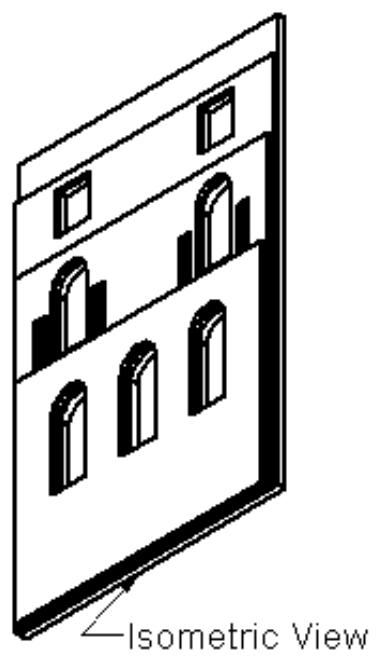
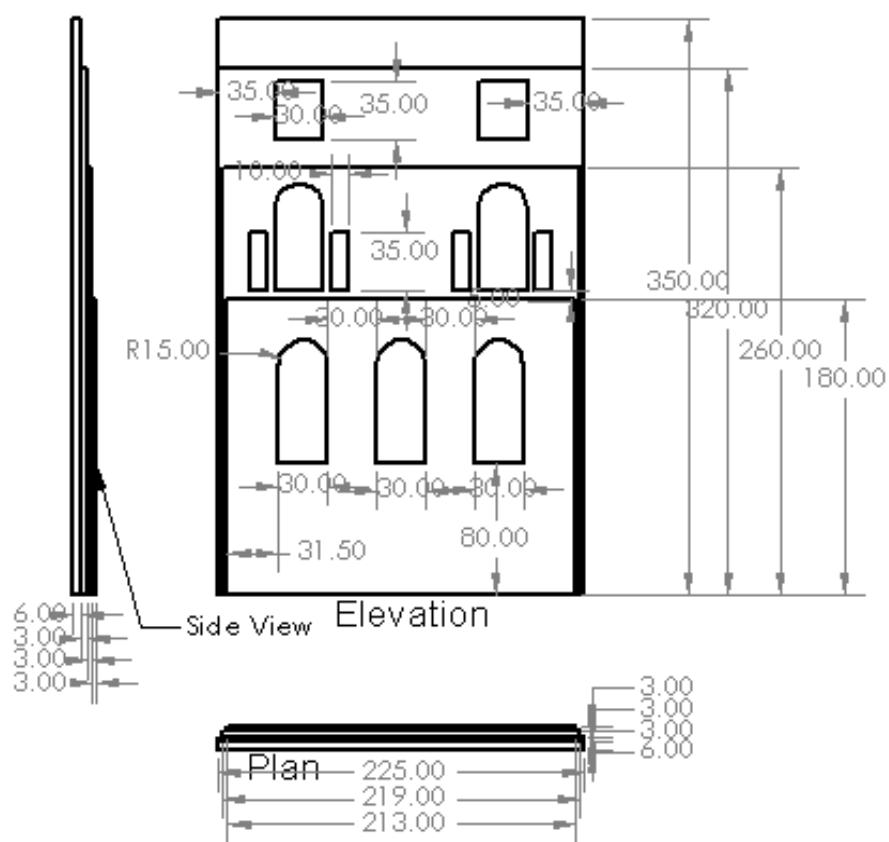


**Material : 6mm + 3mm MDF**  
**Finish: Painted White**

F

### Parts Included:

1. F Base (6mm)
2. F Rim 1 (3mm)
3. F Rim 2 (3mm)
4. F Rim 3 (3mm)



K

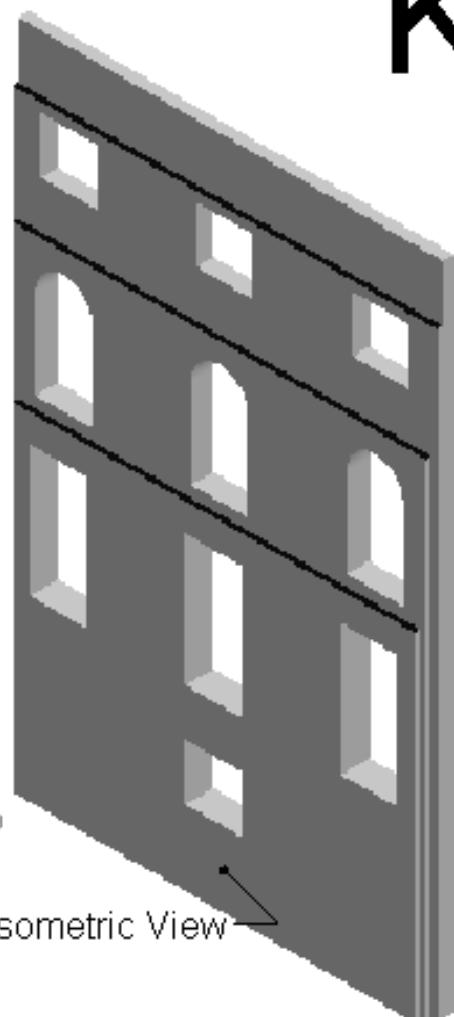
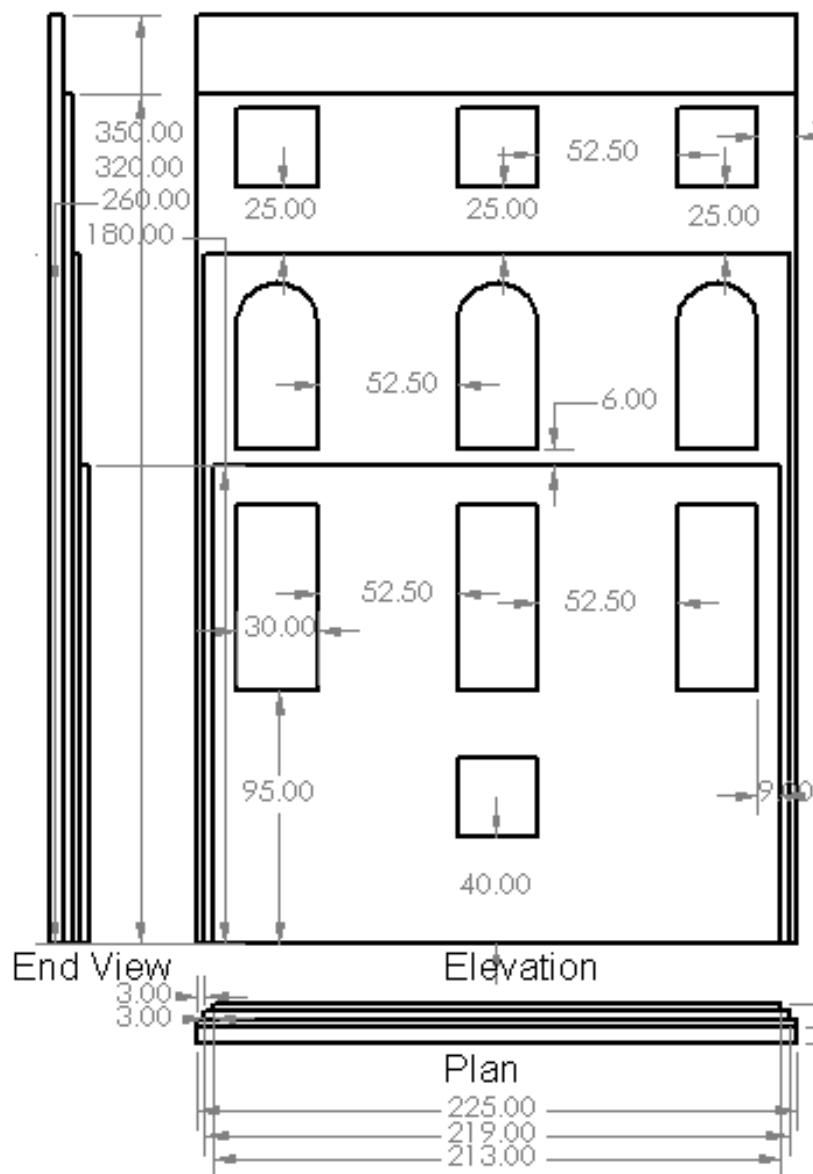
## Parts Included:

1. K Base (6mm)
2. K Rim 1 (3mm)
3. K Rim 2 (3mm)
4. K Rim 3 (3mm)

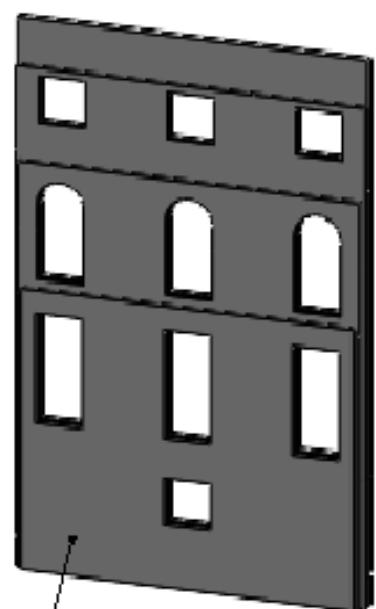
Material : 6mm + 3mm MDF

Finish: Painted White

2. Top Profiles Painted Black



Isometric View



Dimetric View

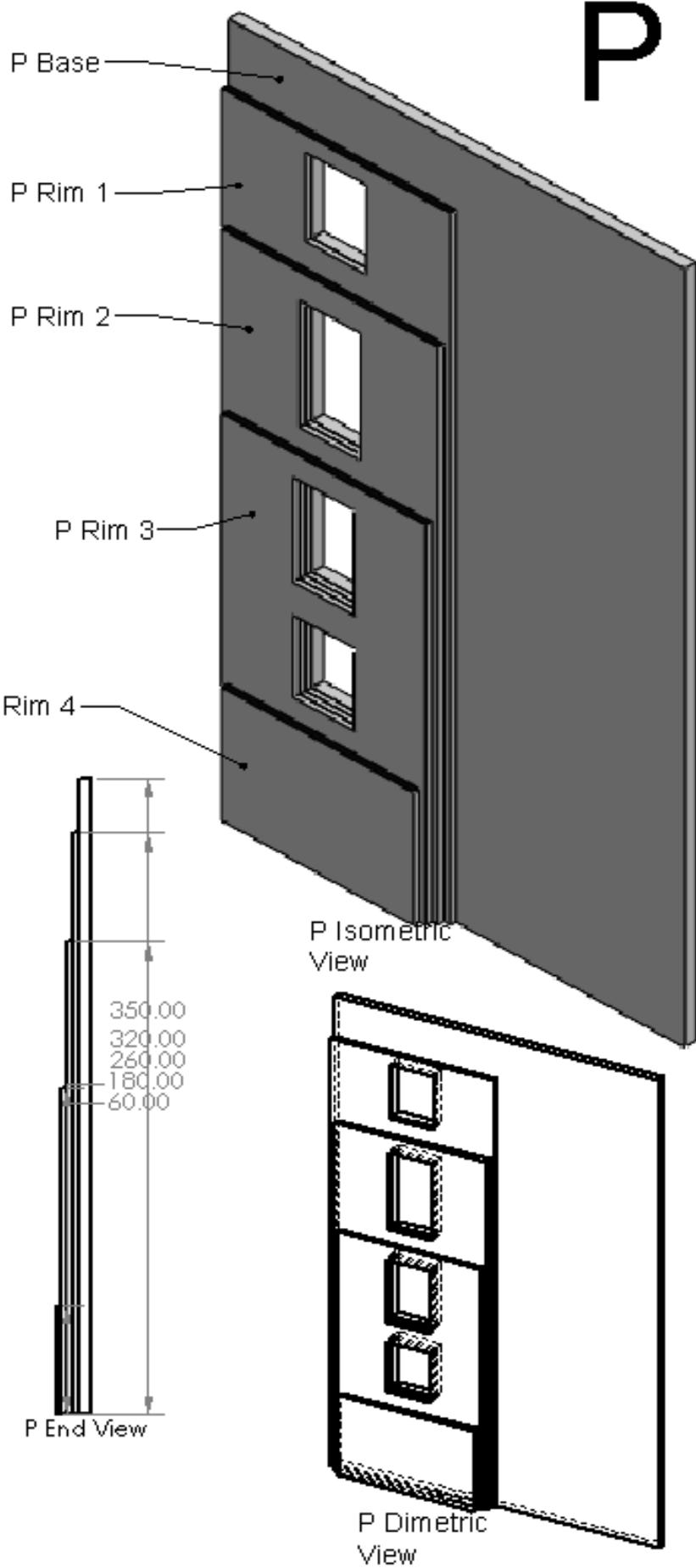
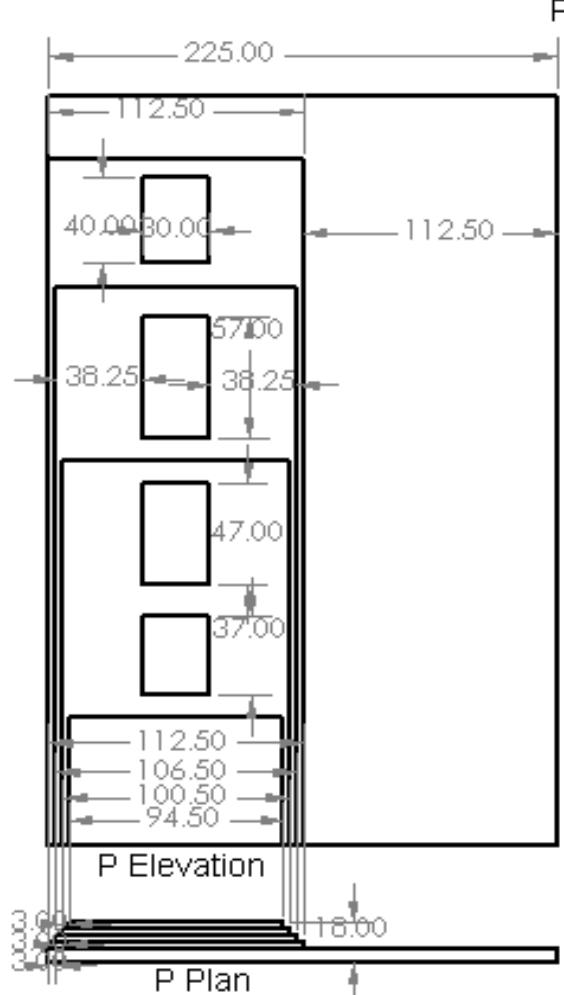
## Parts Included:

1. P Base (6mm)
2. P Rim 1 (3mm)
3. P Rim 2 (3mm)
4. P Rim 3 (3mm)
5. P Rim 4 (3mm)

Material : 6mm + 3mm MDF

Finish: Painted White

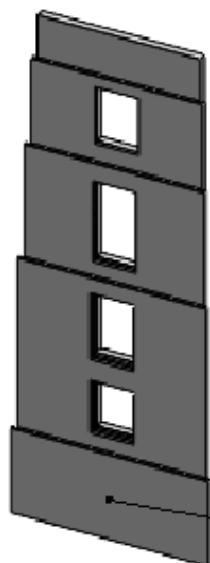
2. Top Profiles Painted Black



# SCMI

## Parts Included:

1. SCMI Base x4 (6mm)
2. SCMI Rim 1 x4 (3mm)
3. SCMI Rim 2 x4 (3mm)
4. SCMI Rim 3 x4 (3mm)
5. SCMI Rim 4 x4 (3mm)

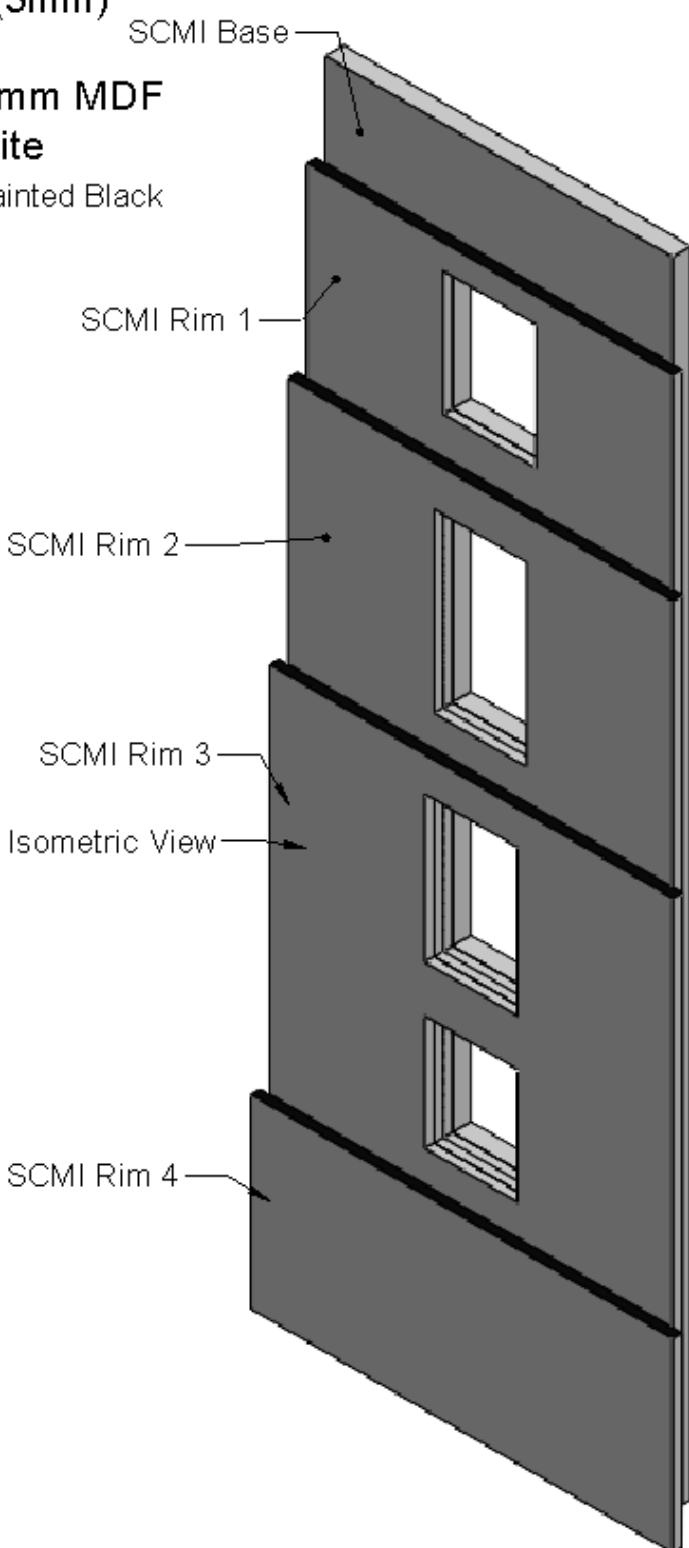
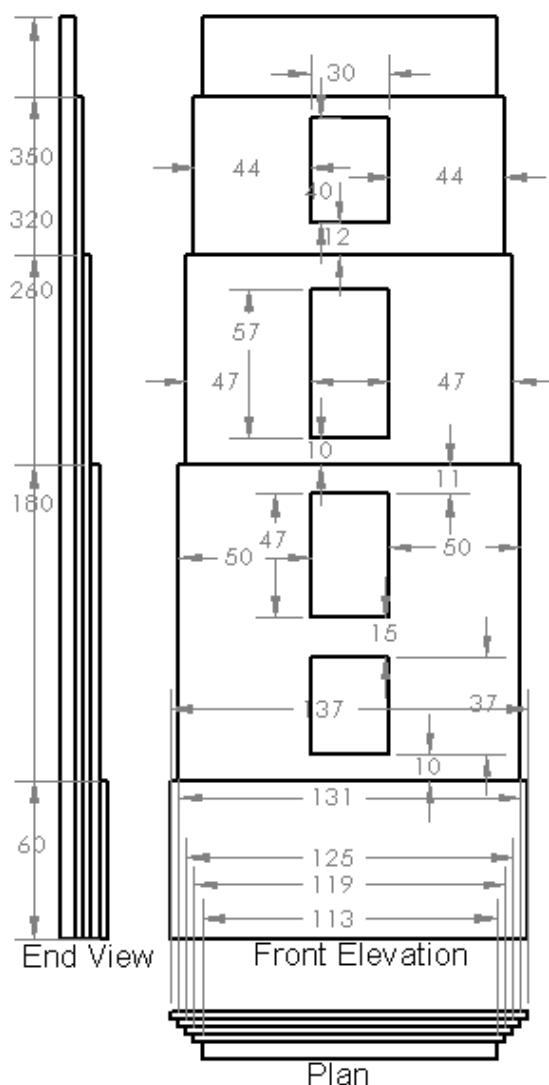


Material : 6mm + 3mm MDF

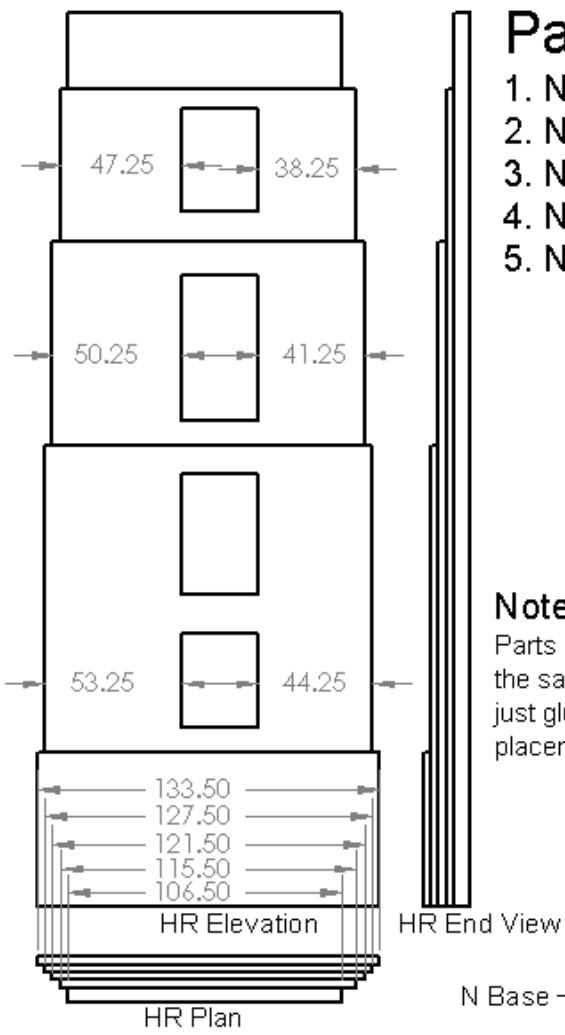
Finish: Painted White

2. Top Profiles Painted Black

Dimetric View



# NRH

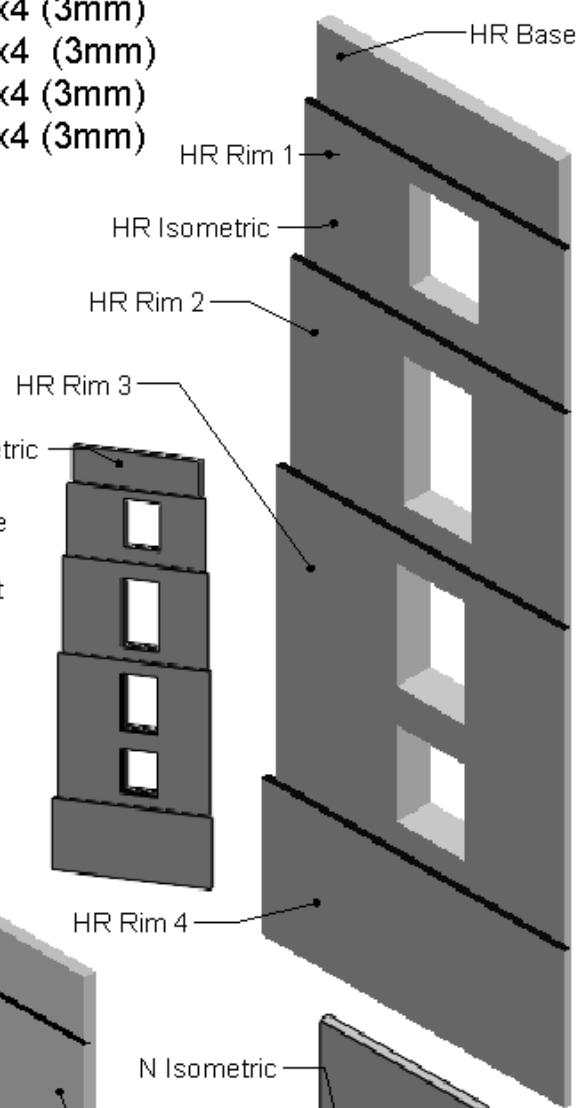


## Parts Included:

1. NRH Base x4 (6mm)
2. NRH Rim 1 x4 (3mm)
3. NRH Rim 2 x4 (3mm)
4. NRH Rim 3 x4 (3mm)
5. NRH Rim 4 x4 (3mm)

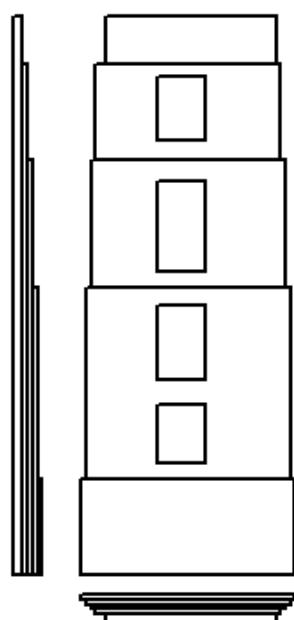
### Note:

Parts HR And N utilize the same pieces, just glued in a different placement (Reverse)



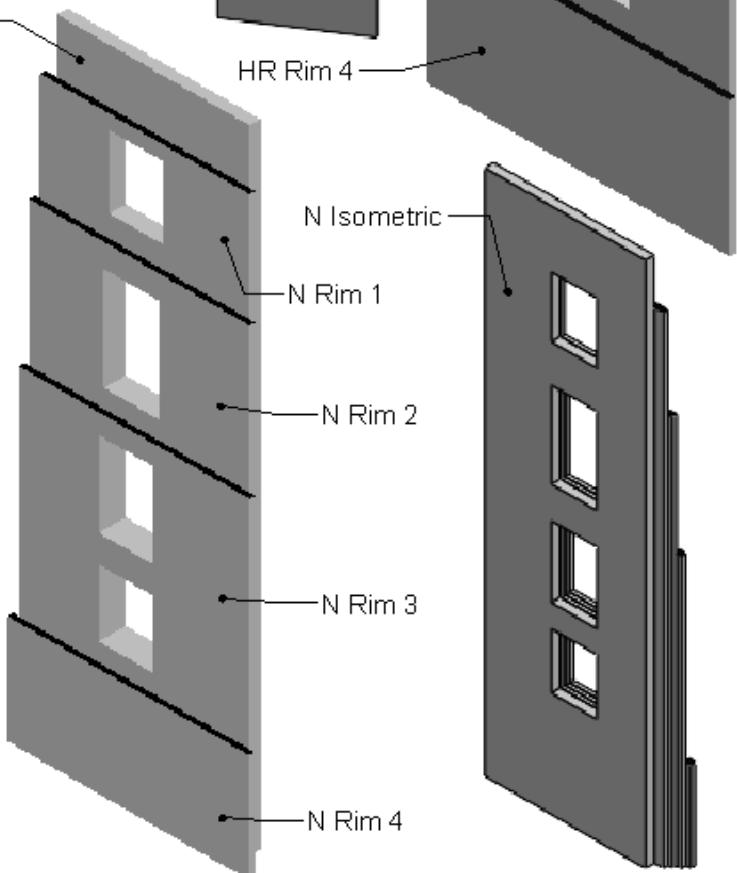
**Material : 6mm + 3mm MDF**  
**Finish: Painted White**

2.Top Profiles Painted Black

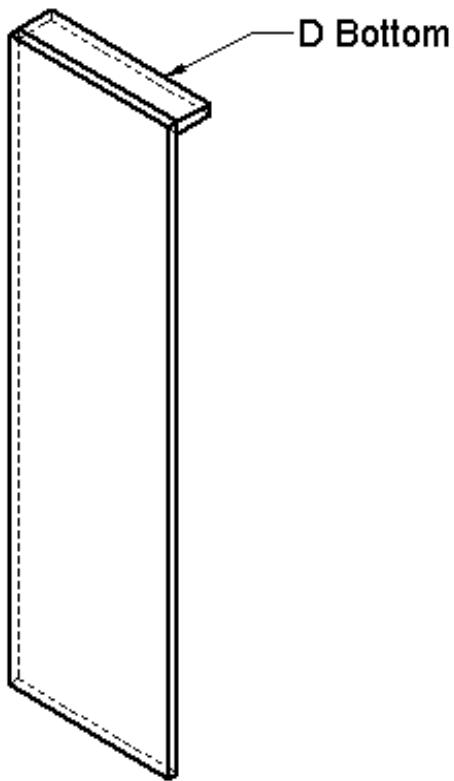


### Note 2:

Parts NRH, were designed off of SCMI But shifted to the side to align the windows in the center when placed against piece SCMI



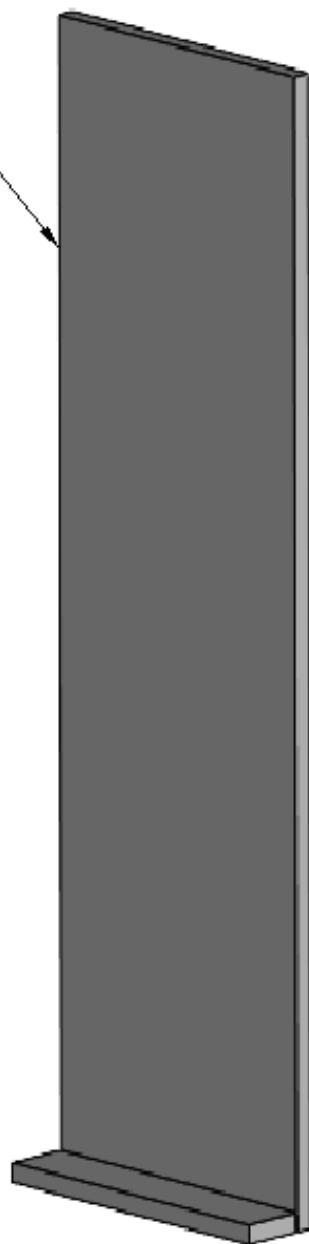
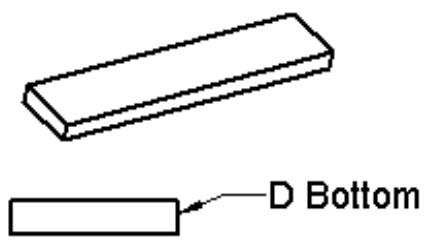
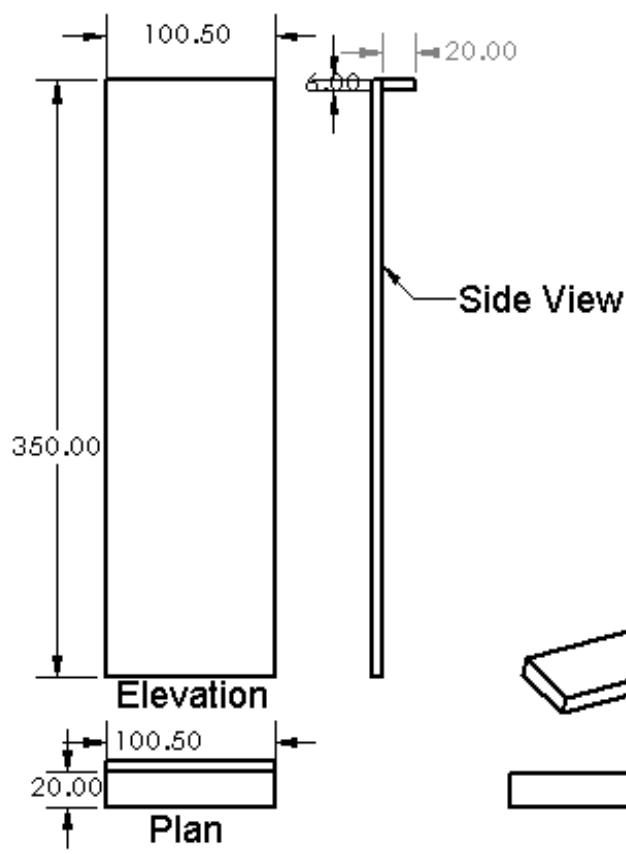
D



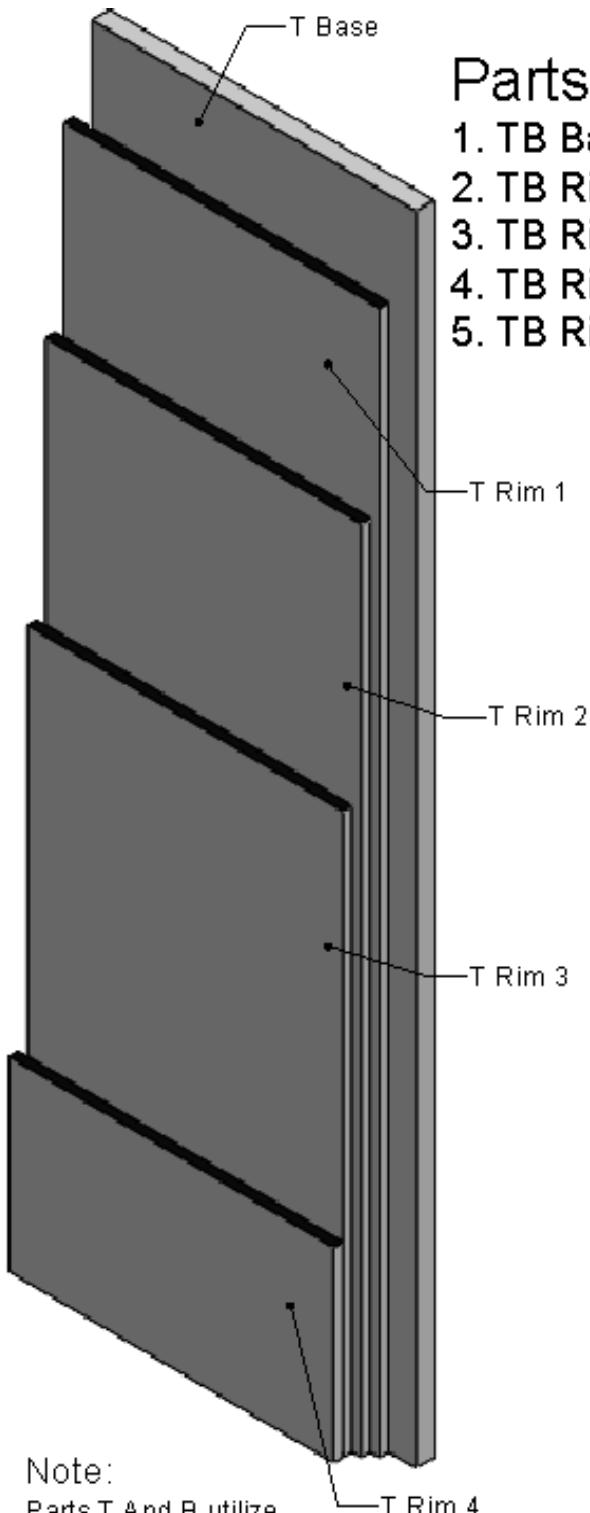
## Parts Included:

1. D Base (6mm)
2. D Bottom (6mm)

Material : 6mm MDF  
Finish: Painted White



# TB

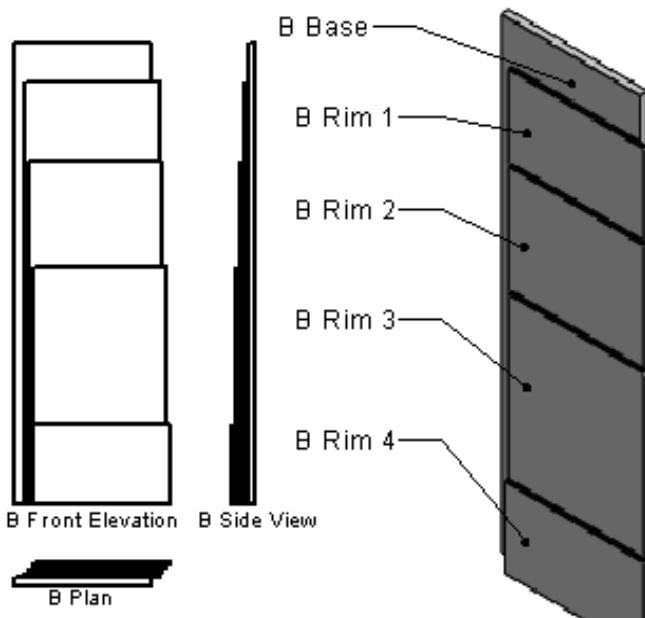
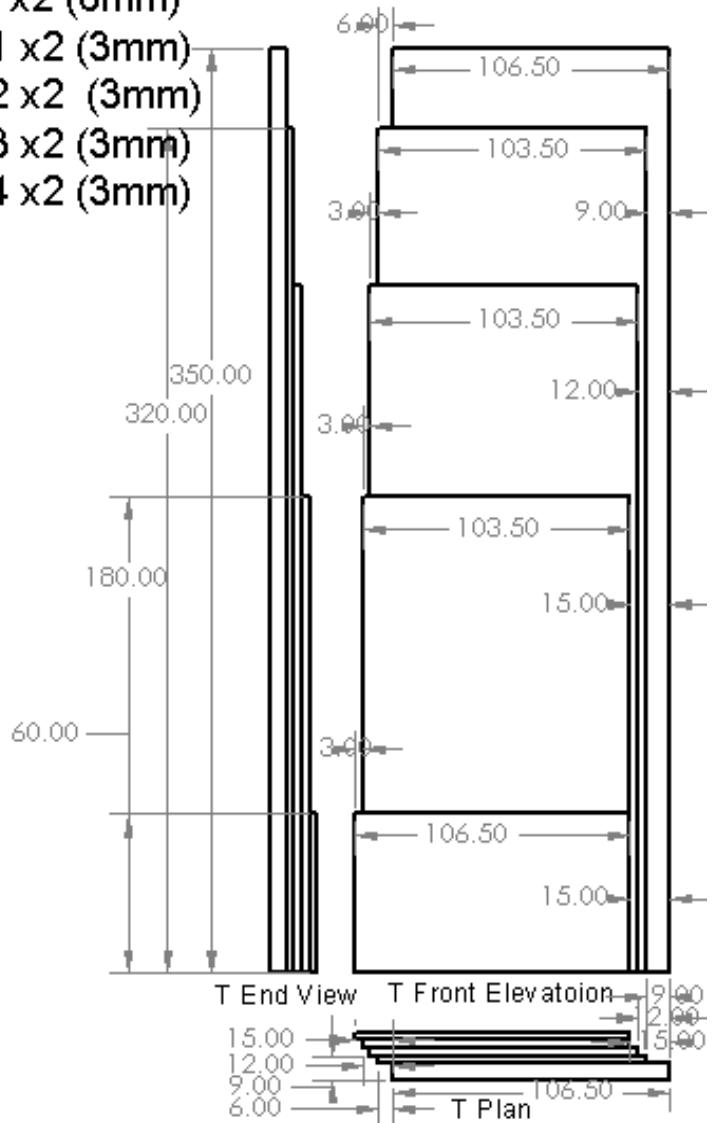


**Note:**

Parts T And B utilize  
the same pieces,  
just glued in a different  
placement (Reverse)

## Parts Included:

1. TB Base x2 (6mm)
2. TB Rim 1 x2 (3mm)
3. TB Rim 2 x2 (3mm)
4. TB Rim 3 x2 (3mm)
5. TB Rim 4 x2 (3mm)

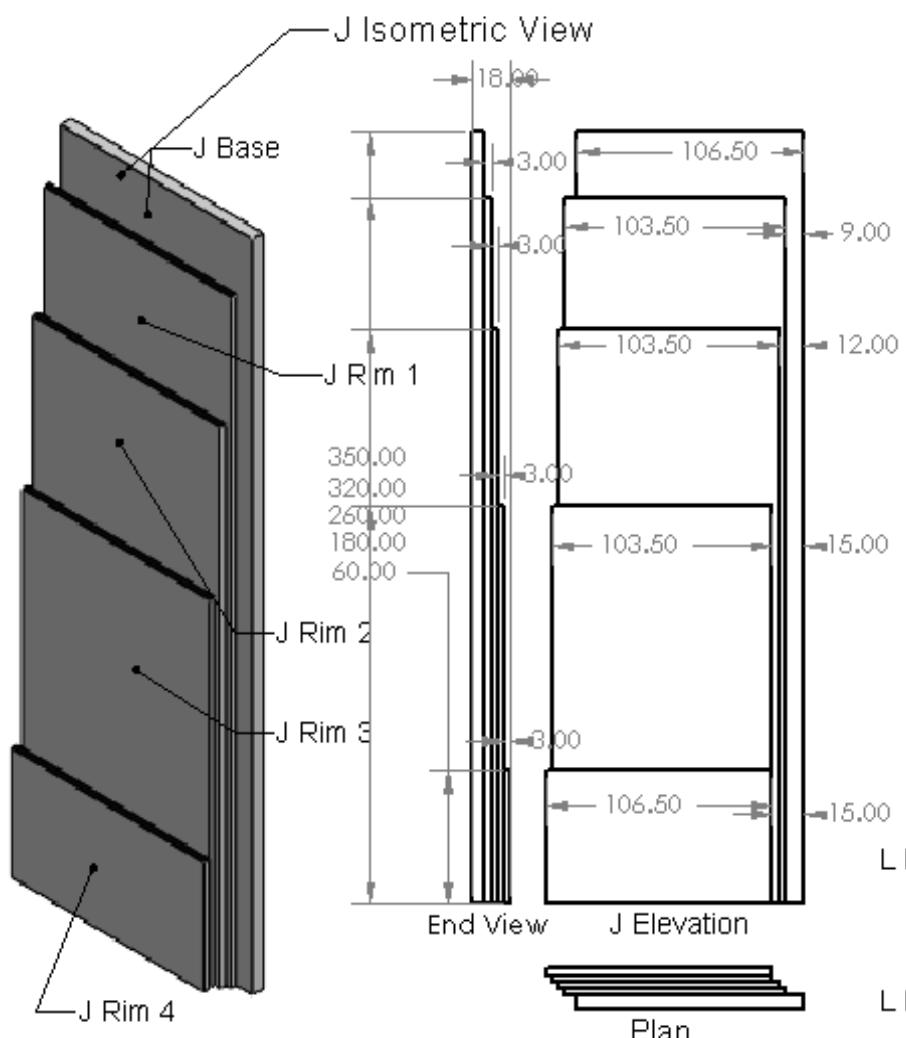


**Material : 6mm + 3mm MDF**

**Finish: Painted White**

2.Top Profiles Painted Black

**JL**

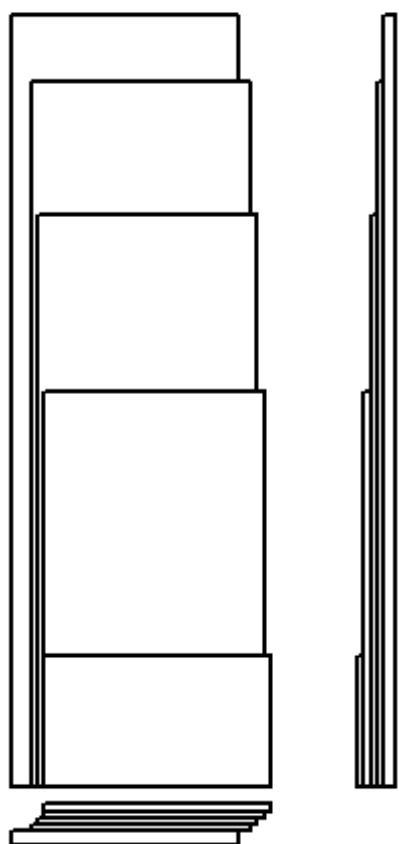
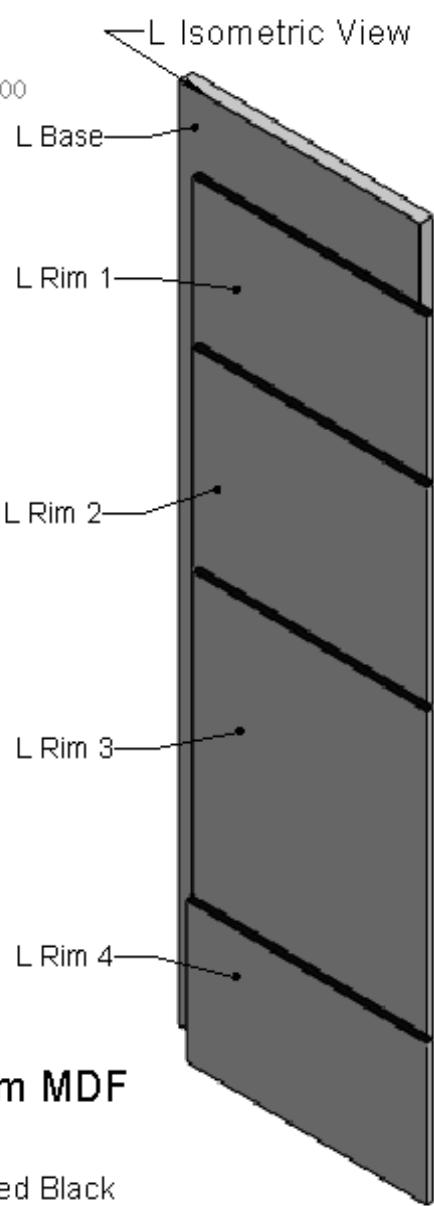


## Parts Included:

1. JL Base x2 (6mm)
2. JL Rim 1 x2 (3mm)
3. JL Rim 2 x2 (3mm)
4. JL Rim 3 x2 (3mm)
5. JL Rim 4 x2 (3mm)

### Note:

Parts J And L utilize the same pieces, just glued in a different placement (Reverse)



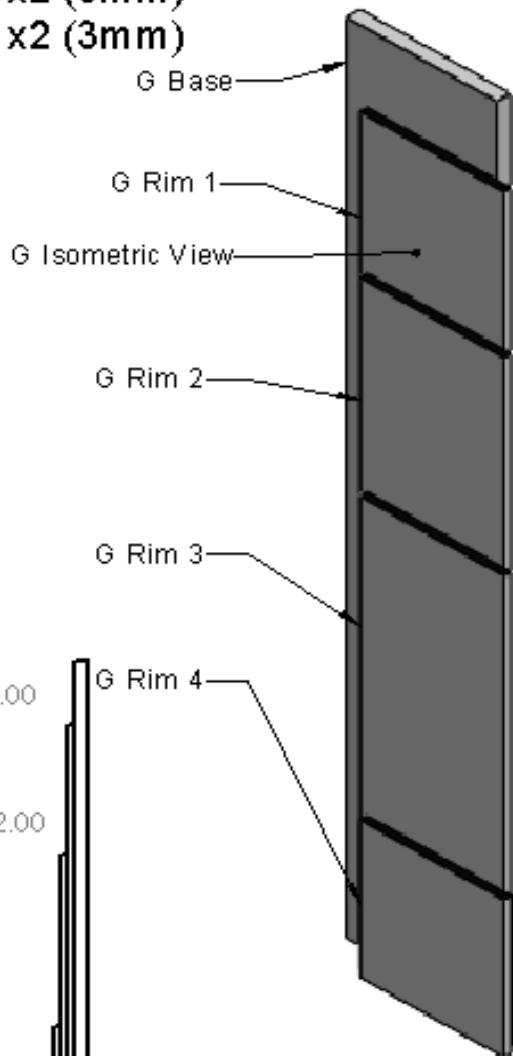
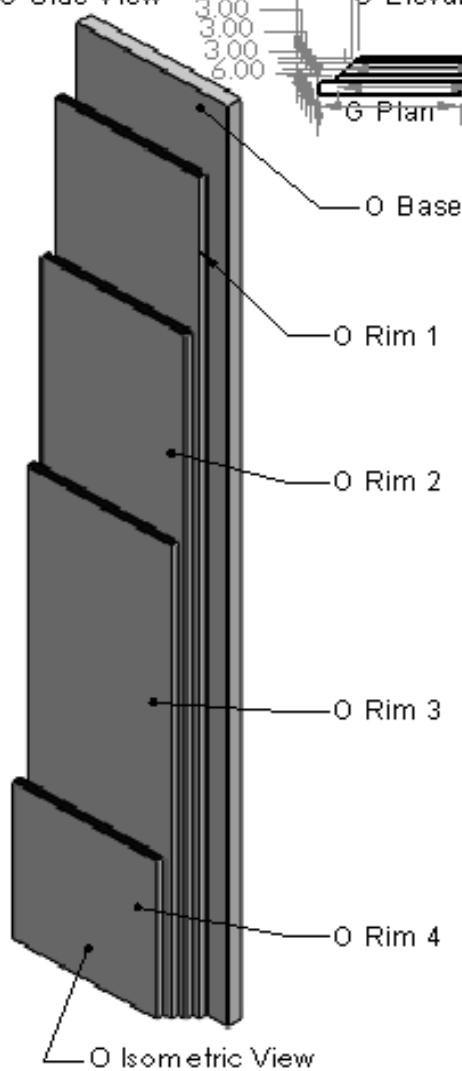
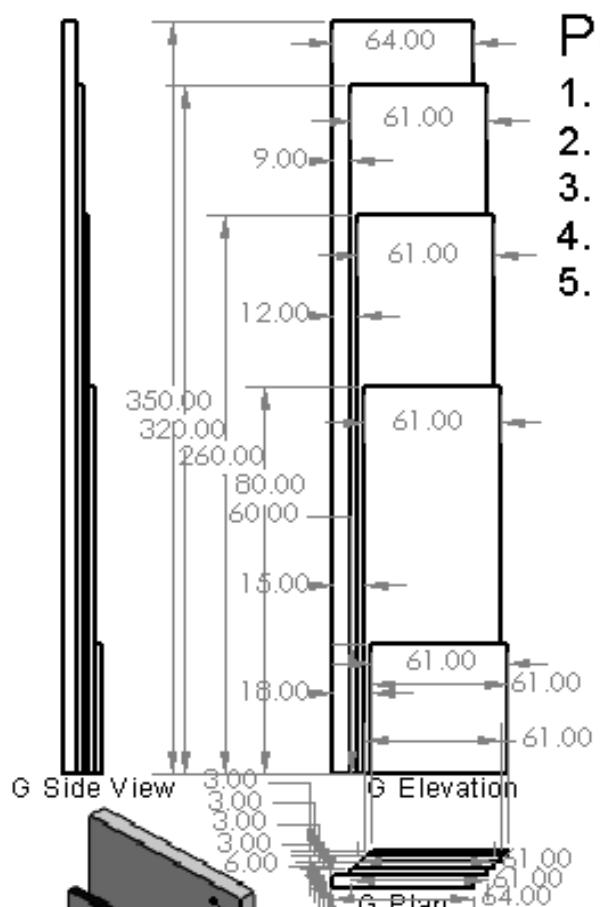
**Material : 6mm + 3mm MDF**  
**Finish: Painted White**

2. Top Profiles Painted Black

# GO

## Parts Included:

1. GO Base x2 (6mm)
2. GO Rim 1 x2 (3mm)
3. GO Rim 2 x2 (3mm)
4. GO Rim 3 x2 (3mm)
5. GO Rim 4 x2 (3mm)



Note:  
Parts G And O utilize  
the same pieces,  
just glued in a different  
placement (Reverse)

**Material : 6mm + 3mm MDF**  
**Finish: Painted White**

2. Top Profiles Painted Black

## Parts Included:

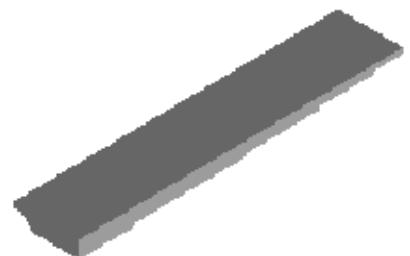
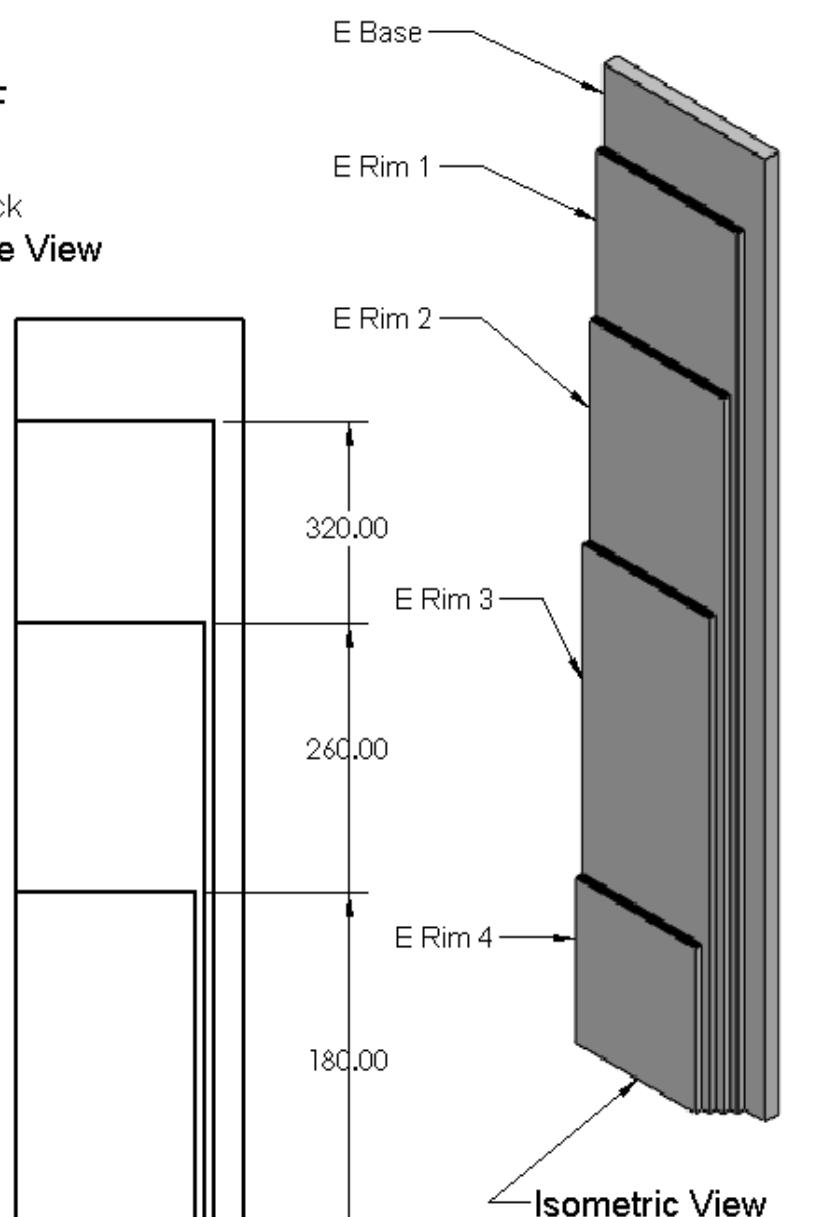
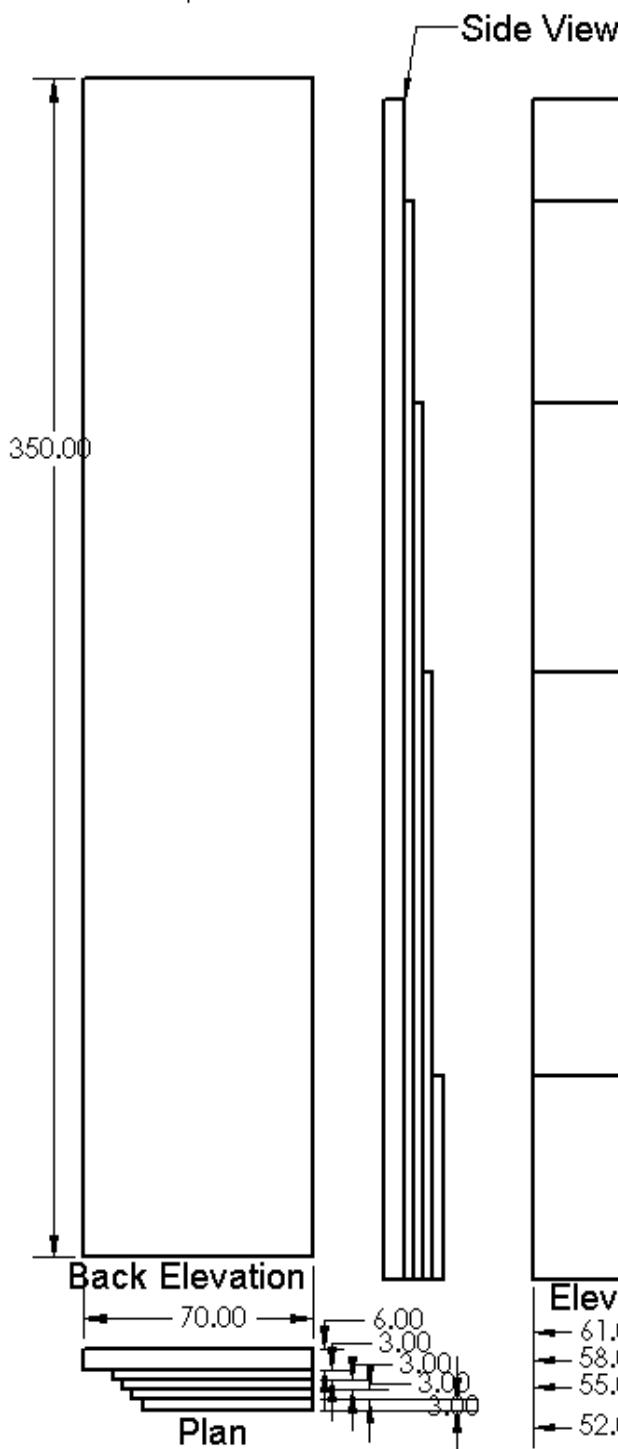
1. E Base (6mm)
2. E Rim 1 (3mm)
3. E Rim 2 (3mm)
4. E Rim 3 (3mm)
5. E Rim 4 (3mm)

**E**

Material : 6mm + 3mm MDF

Finish: Painted White

2.Top Profiles Painted Black



**Q**

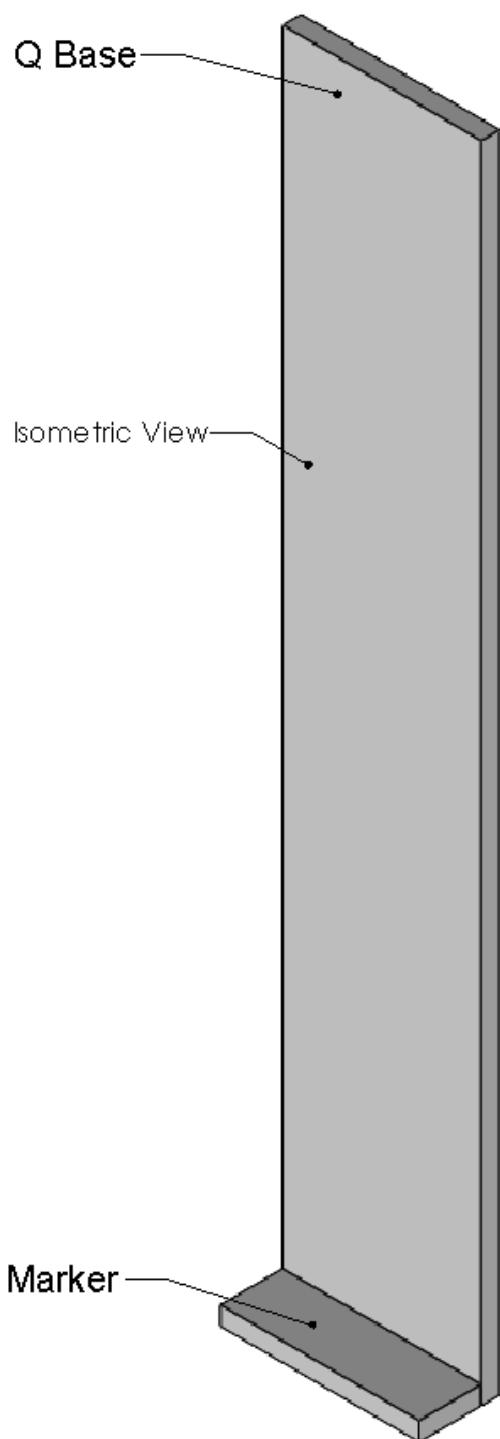
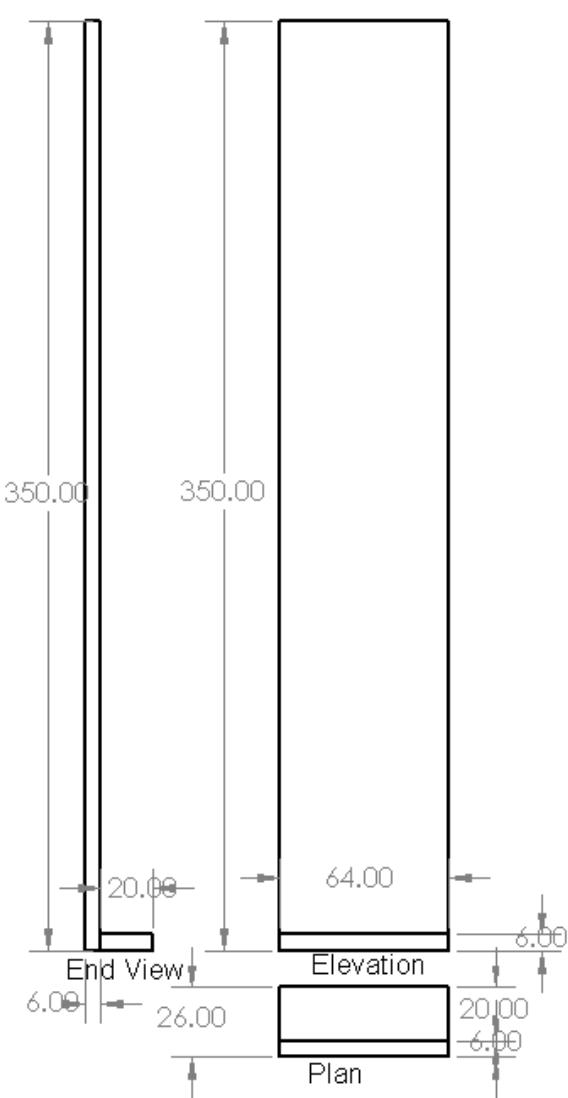
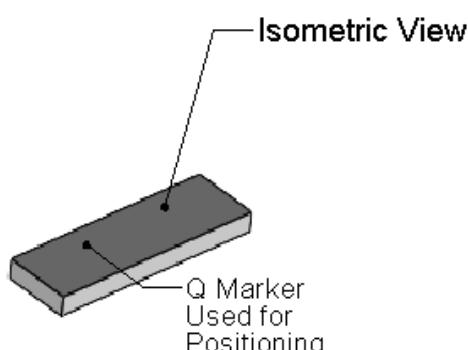


## Parts Included:

1. Q Base (6mm)
2. Q Marker (6mm)

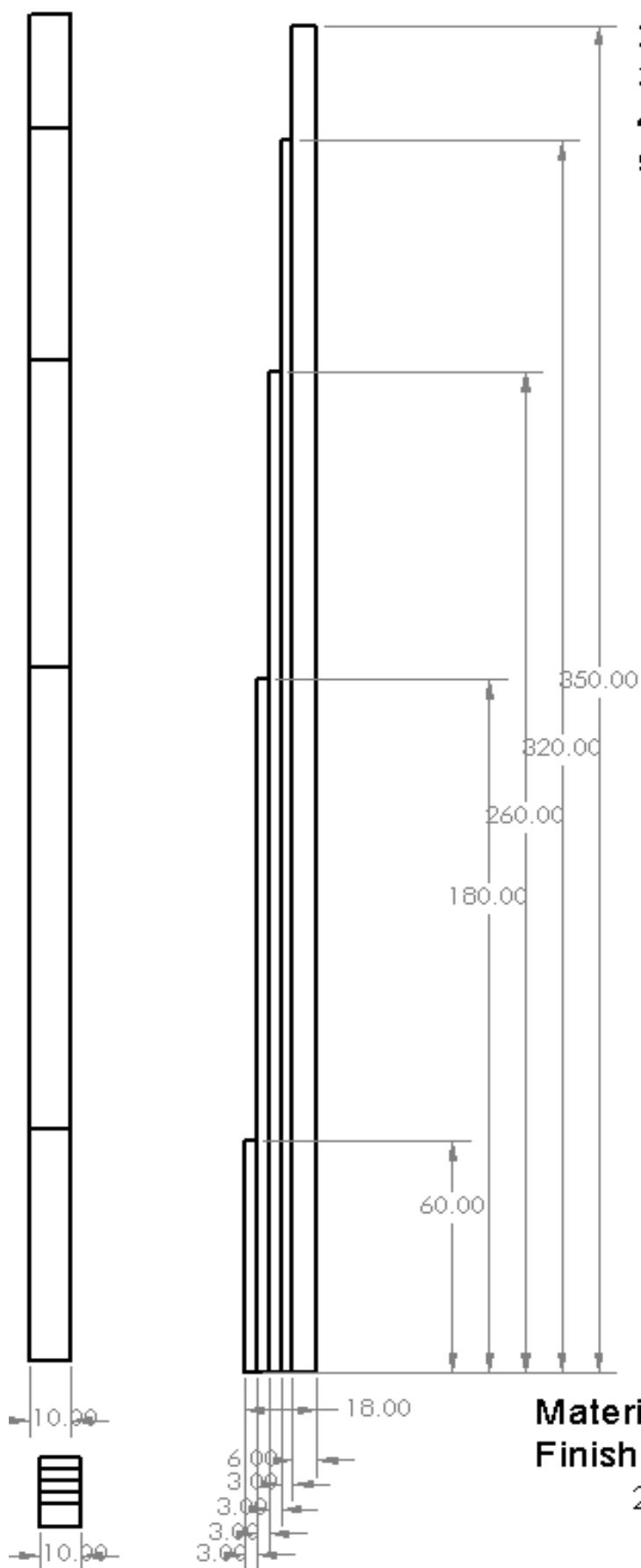
Material : 6mm MDF

Finish: Painted White



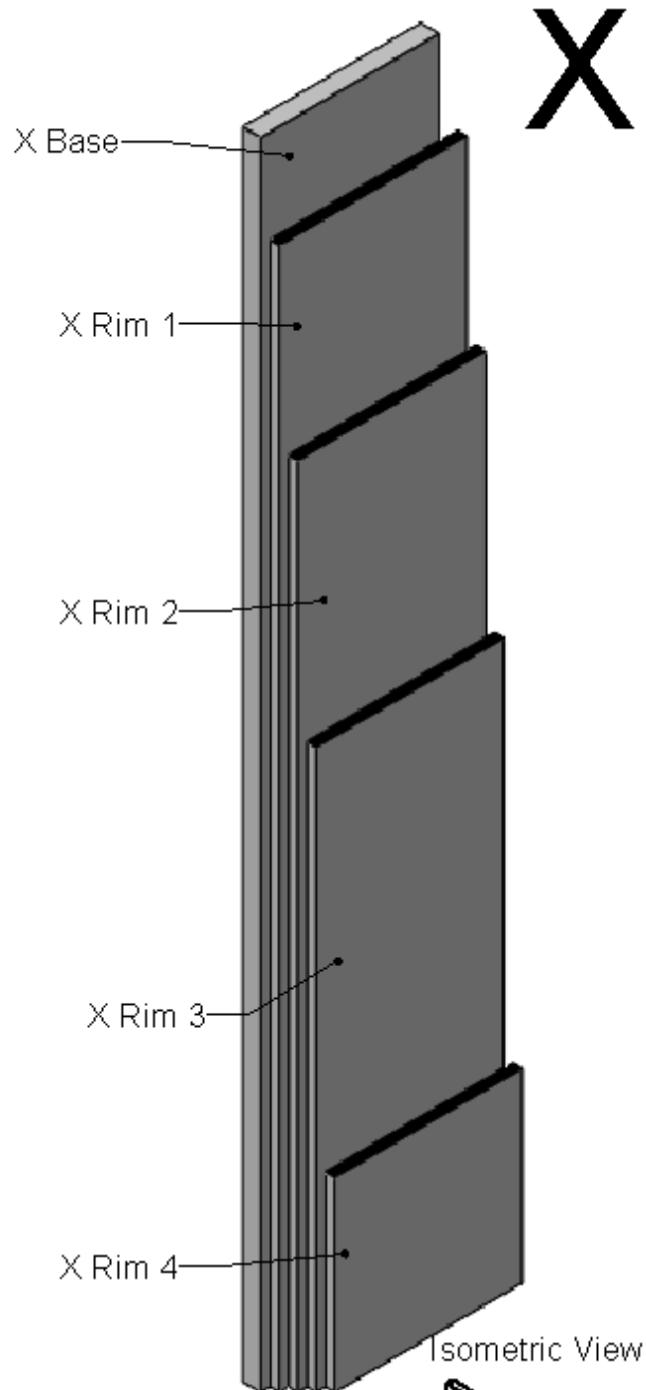
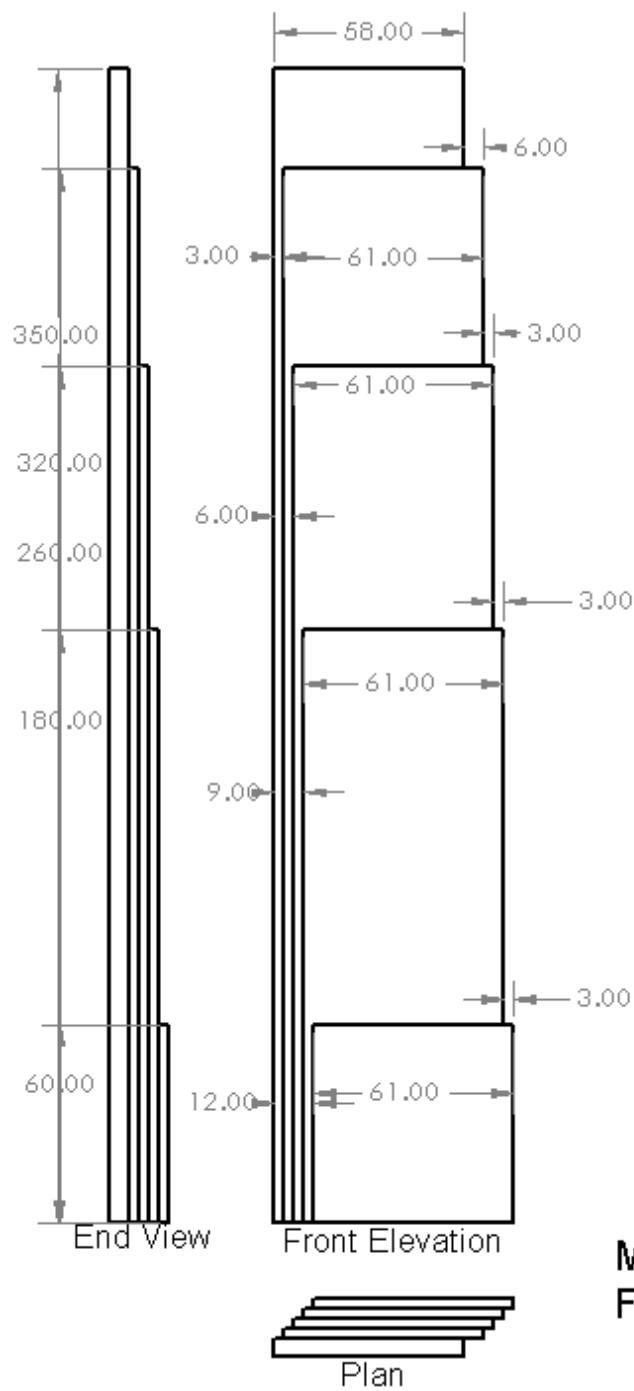
## Parts Included:

1. U Base (6mm)
2. U Rim 1 (3mm)
3. U Rim 2 (3mm)
4. U Rim 3 (3mm)
5. U Rim 4 (3mm)



## Parts Included:

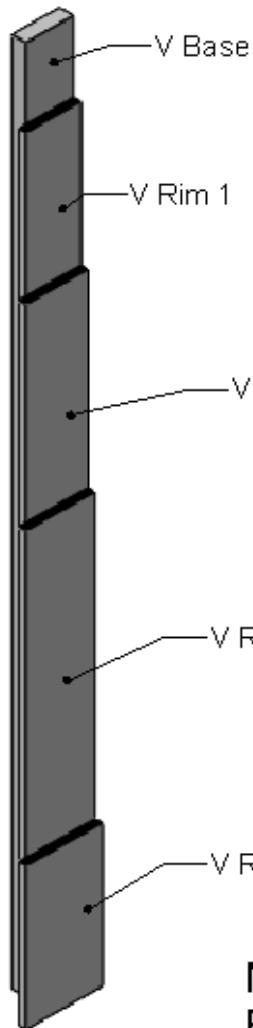
1. X Base (6mm)
2. X Rim 1 (3mm)
3. X Rim 2 (3mm)
4. X Rim 3 (3mm)
5. X Rim 4 (3mm)



Material : 6mm + 3mm MDF  
Finish: Painted White

2.Top Profiles Painted Black





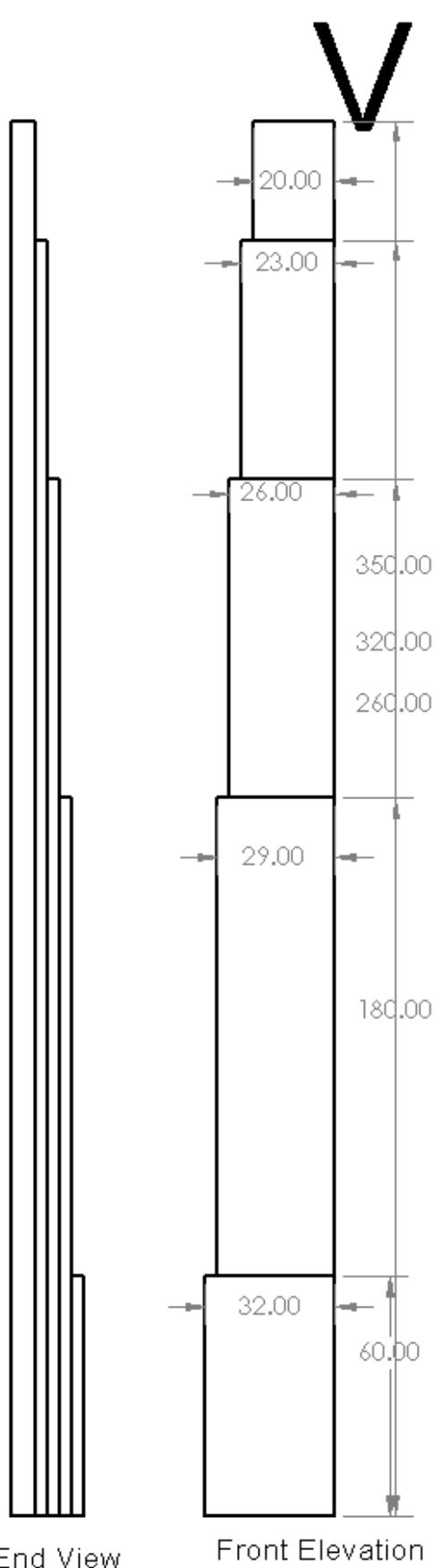
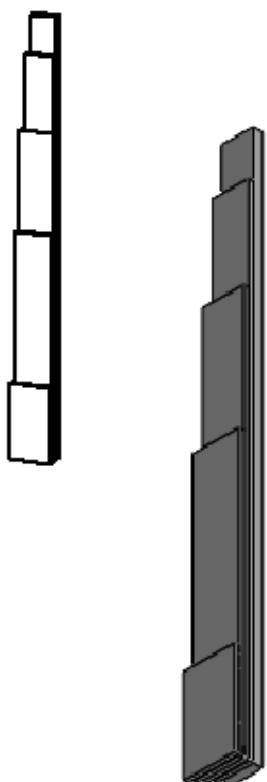
Isometric View

## Parts Included:

1. V Base (6mm)
2. V Rim 1 (3mm)
3. V Rim 2 (3mm)
4. V Rim 3 (3mm)
5. V Rim 4 (3mm)

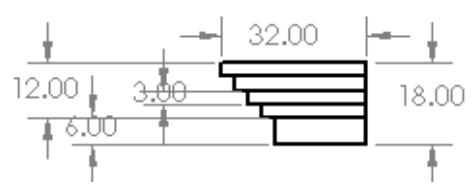
**Material : 6mm + 3mm MDF**  
**Finish: Painted White**

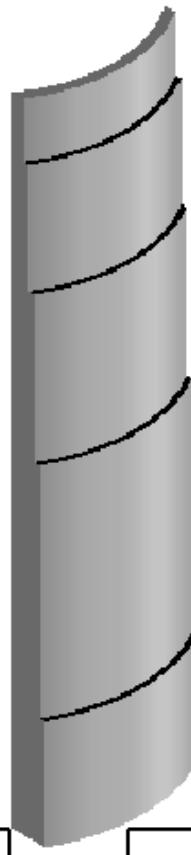
2. Top Profiles Painted Black



End View

Front Elevation





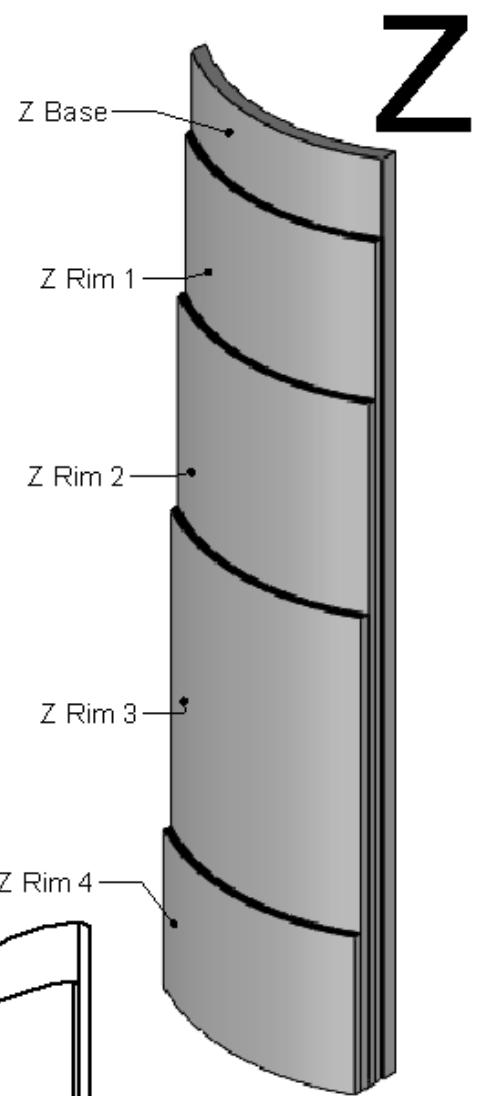
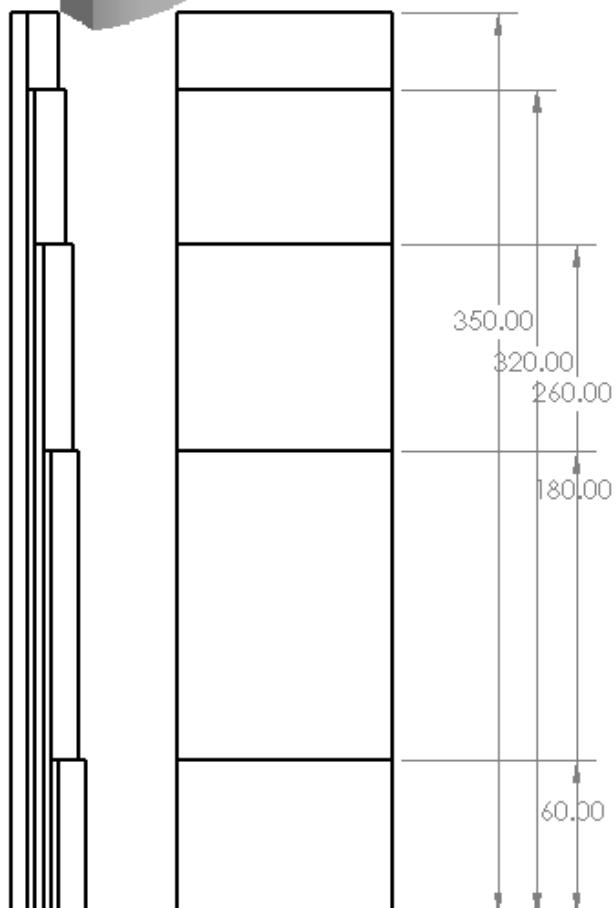
## Parts Included:

1. X Base (6mm)
2. X Rim 1 (3mm)
3. X Rim 2 (3mm)
4. X Rim 3 (3mm)
5. X Rim 4 (3mm)

Material : 6mm + 3mm MDF

Finish: Painted White

2. Top Profiles Painted Black

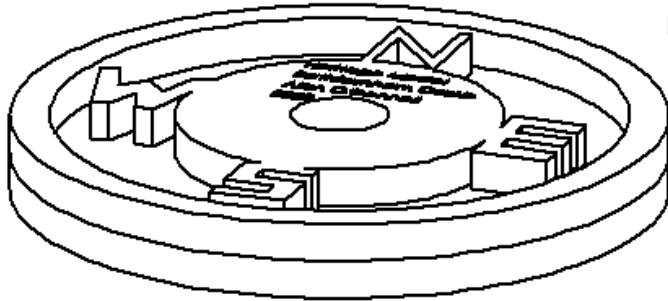


Isometric View

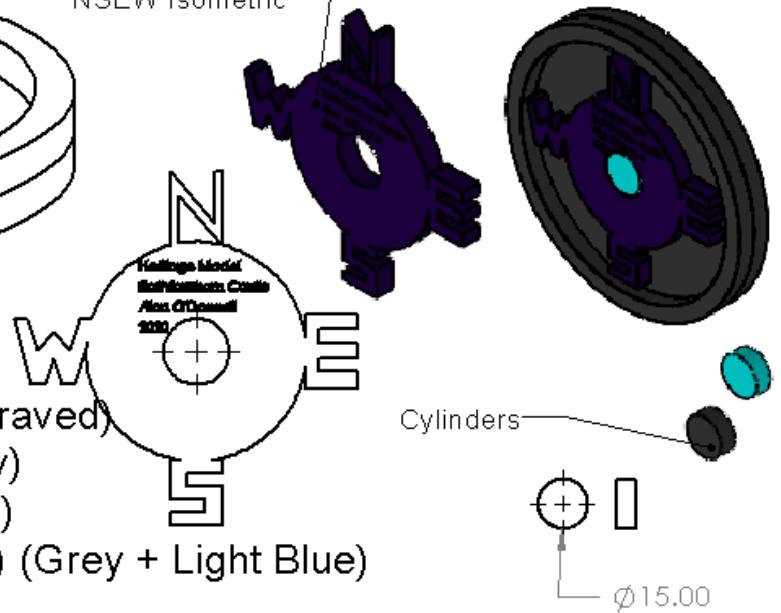
### Note:

Due to bendy ply wood being to difficult to shape i opted to using recycled cardboard

# Compass



NSEW Isometric

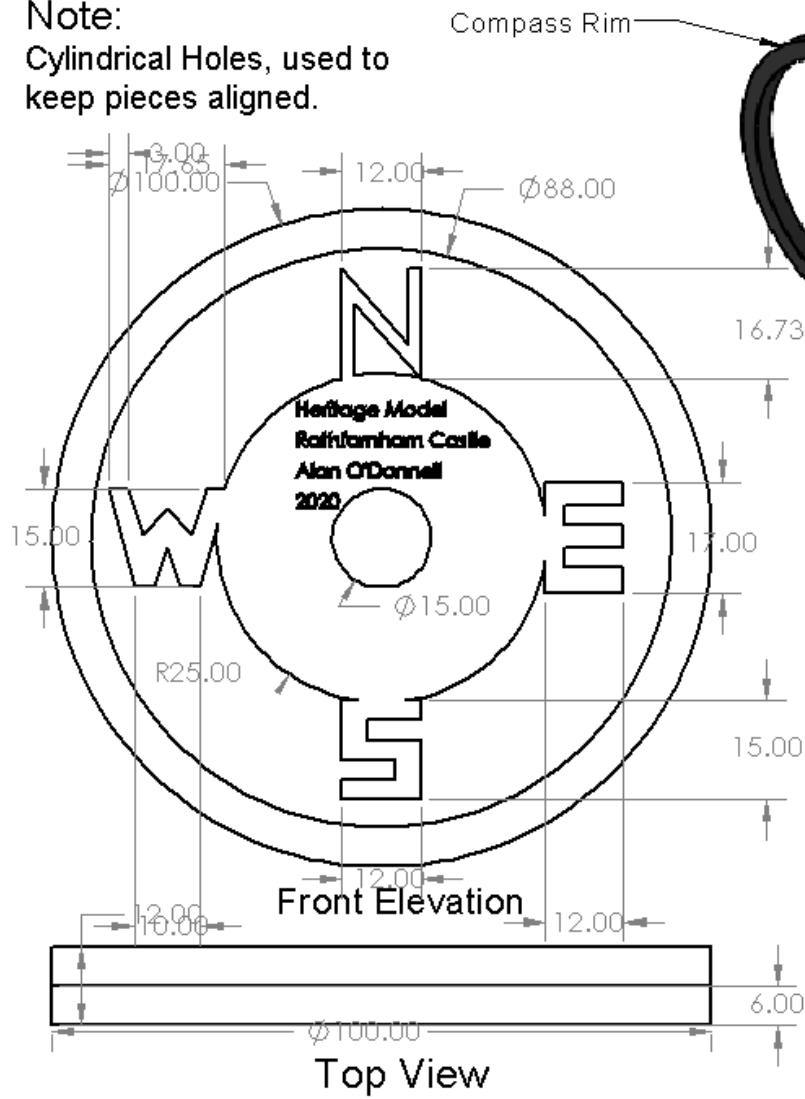


## Parts Included:

1. NSEW (6mm) (Purple) (Engraved)
2. Compass Base (6mm) (Grey)
3. Compass Rim (6mm) (Grey)
4. Compass Cylinder x2 (6mm) (Grey + Light Blue)

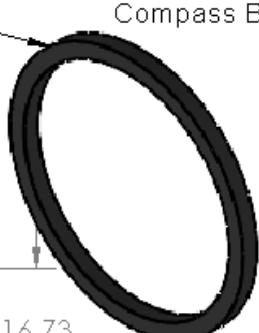
### Note:

Cylindrical Holes, used to keep pieces aligned.



Compass Rim

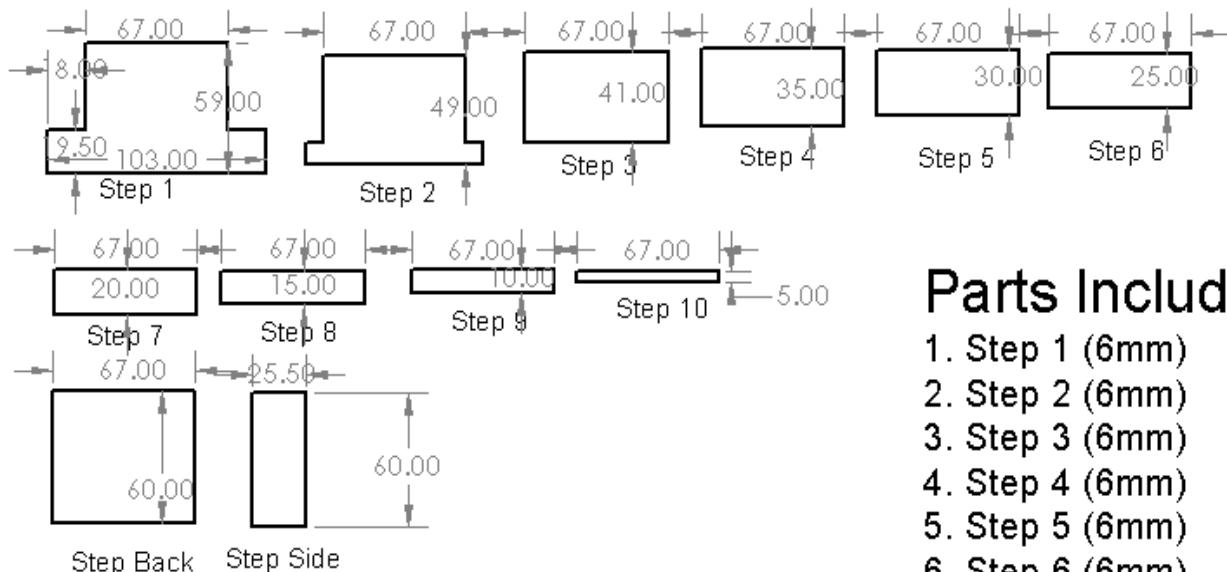
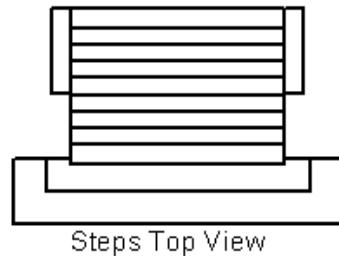
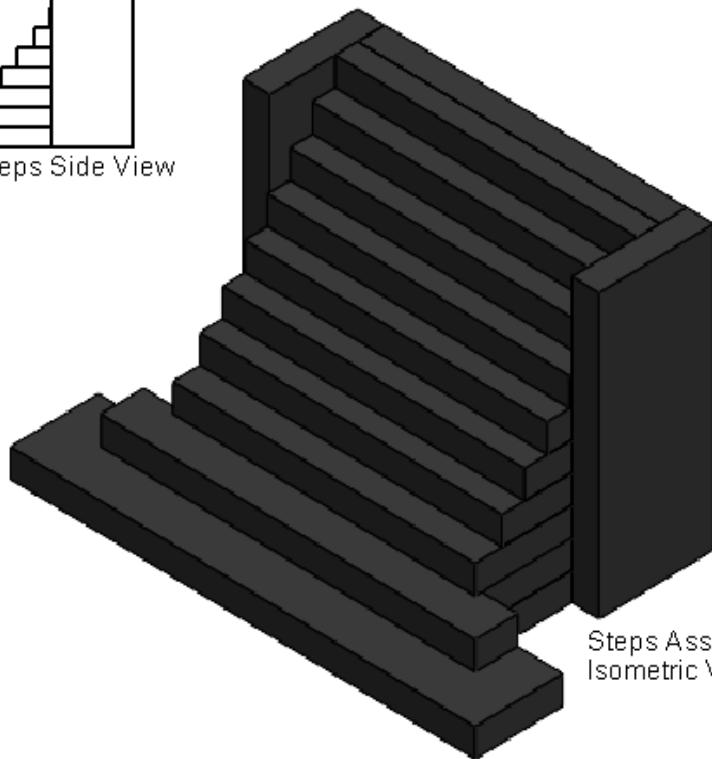
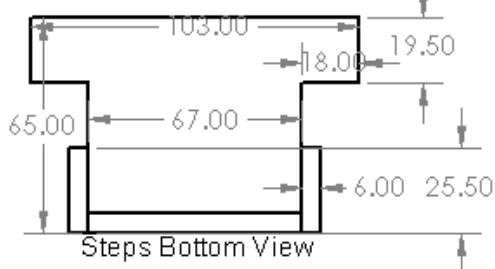
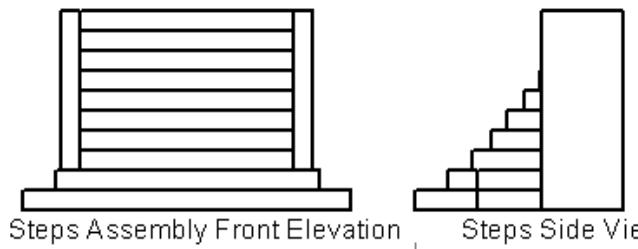
Compass Base



3D View

Material : 6mm MDF  
Finish: Painted

# Steps

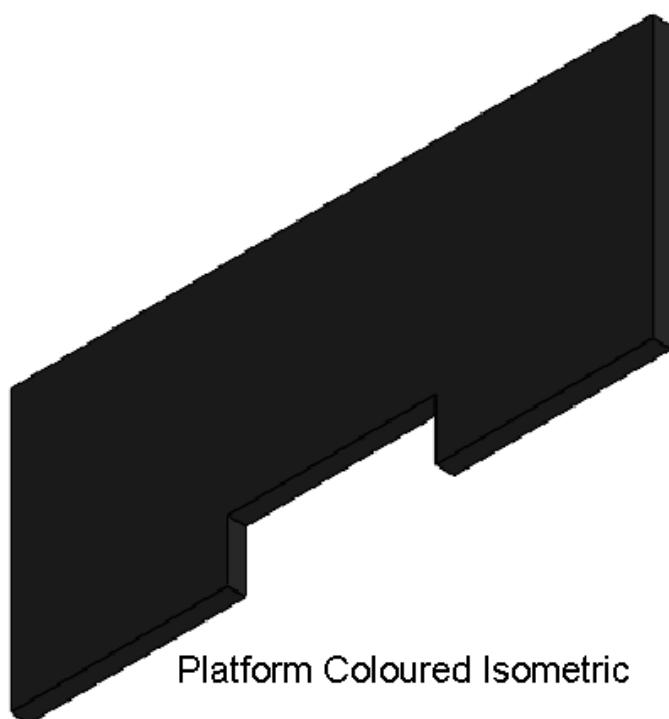


Material : 6mm MDF  
Finish: Painted Grey

## Parts Included:

1. Step 1 (6mm)
2. Step 2 (6mm)
3. Step 3 (6mm)
4. Step 4 (6mm)
5. Step 5 (6mm)
6. Step 6 (6mm)
7. Step 7 (6mm)
8. Step 8 (6mm)
9. Step 9 (6mm)
10. Step 10 (6mm)
11. Step Side x2 (6mm)
12. Step Back x1 (6mm)

# Platform

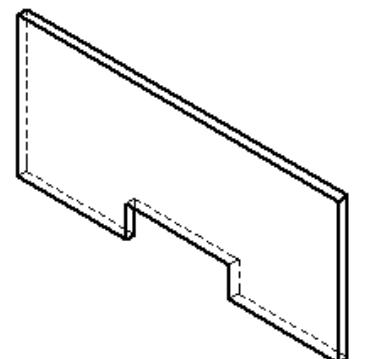


Platform Coloured Isometric

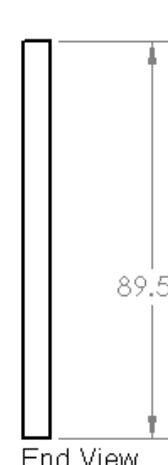
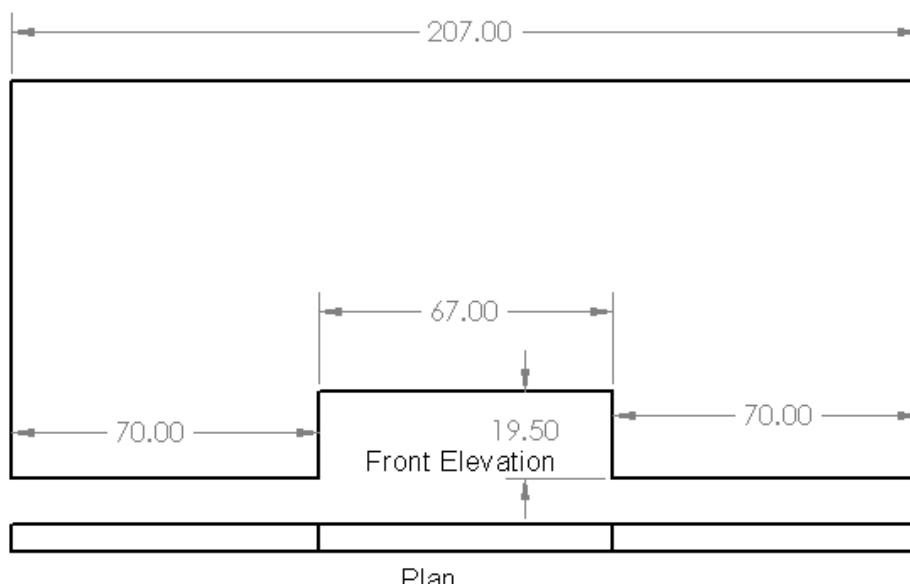
## Parts Included:

1. Platform Base (6mm)

Material : 6mm MDF  
Finish: Painted grey



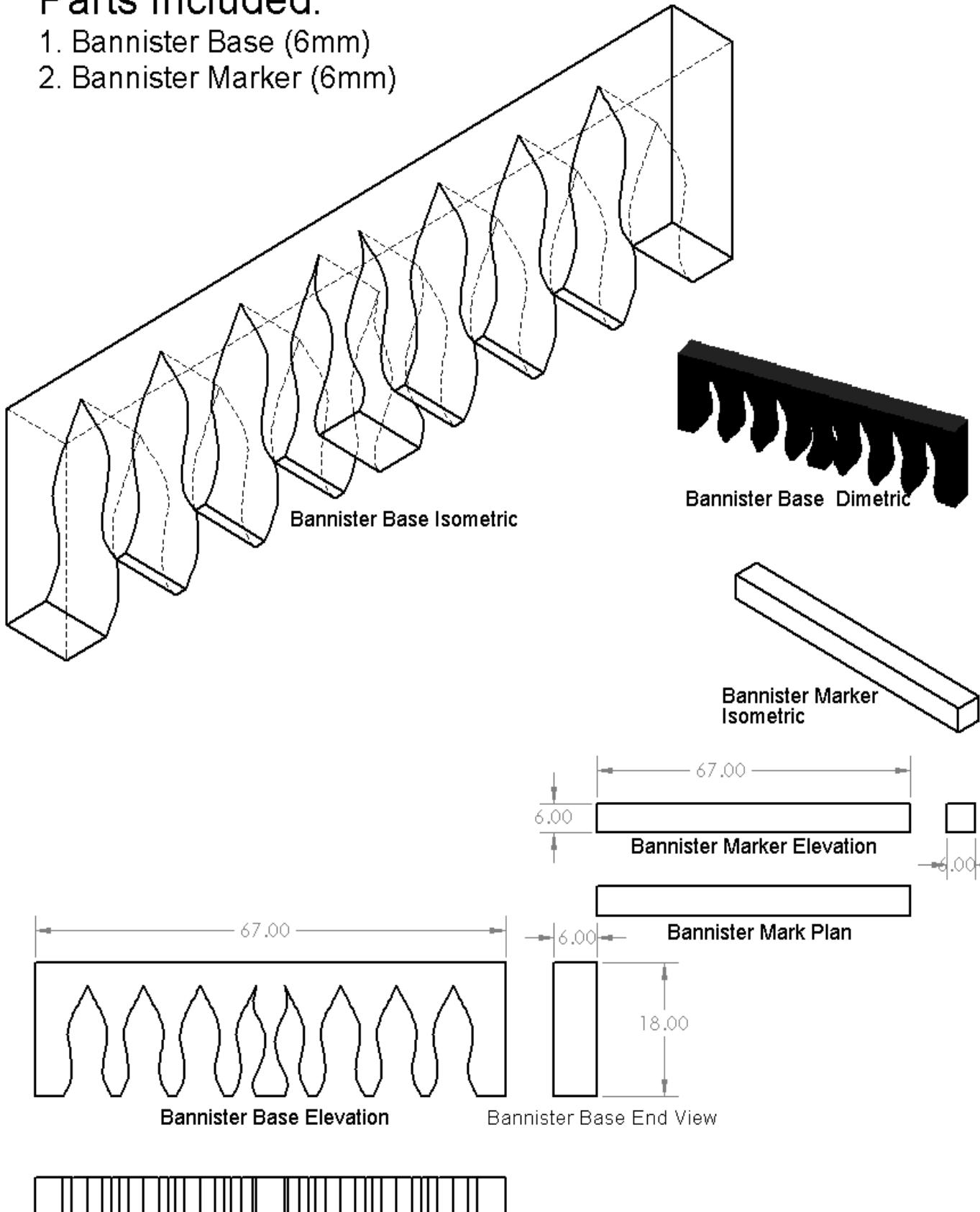
Platform Sketch Isometric



# Bannister

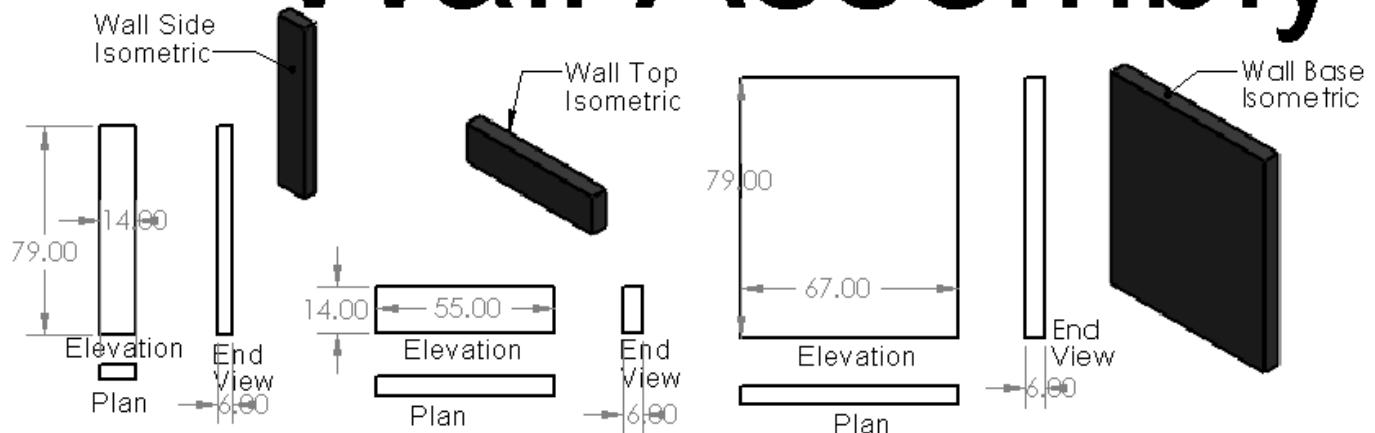
## Parts Included:

1. Bannister Base (6mm)
2. Bannister Marker (6mm)



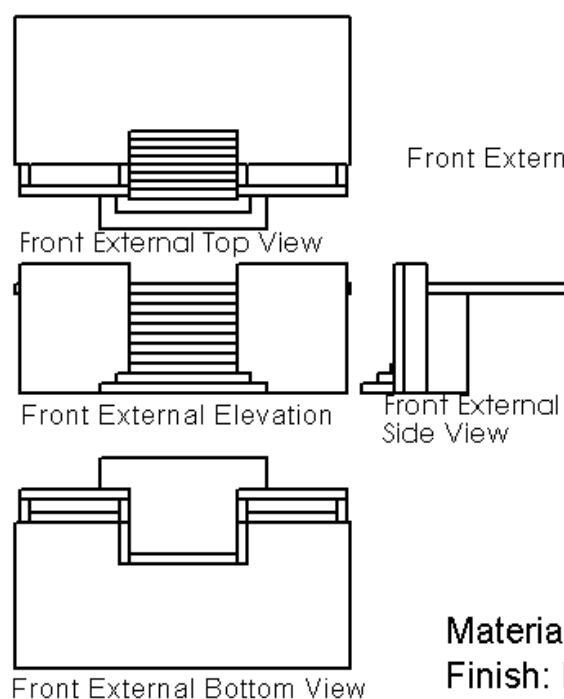
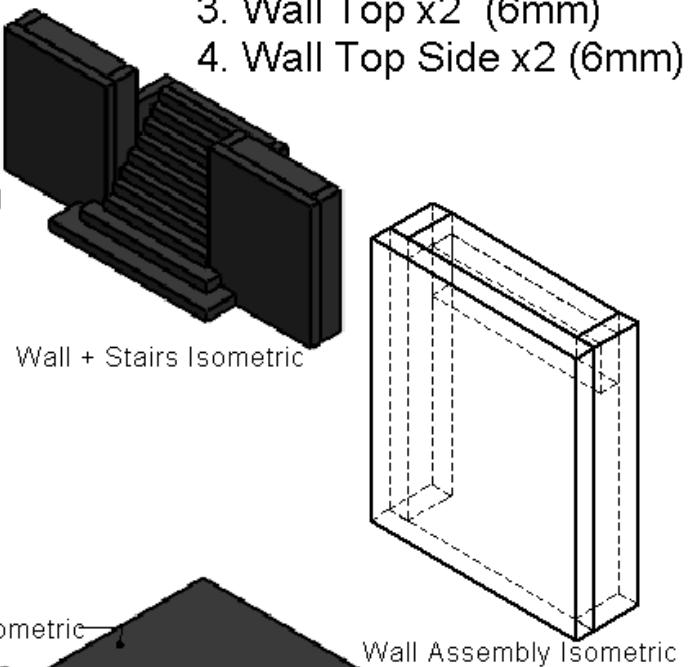
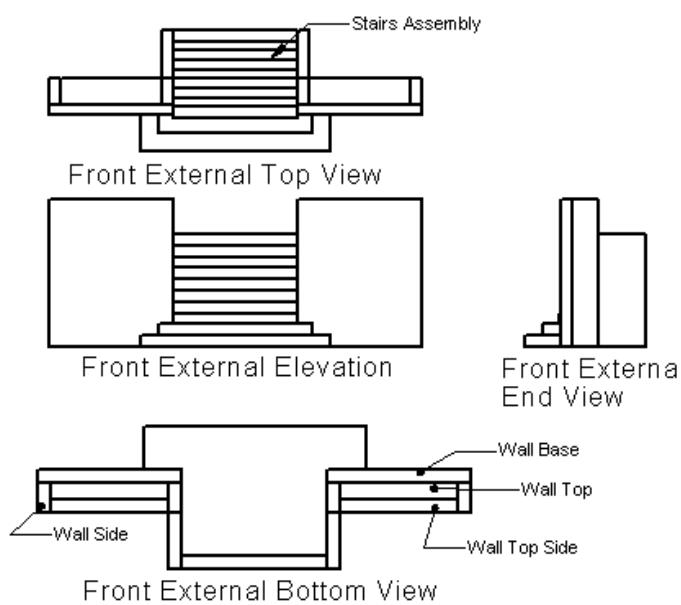
Material : 6mm MDF  
Finish: Painted Black

# Wall Assembly



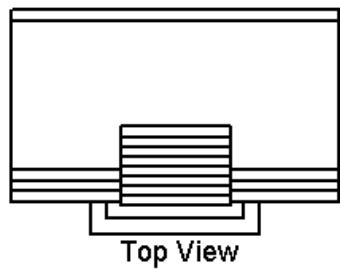
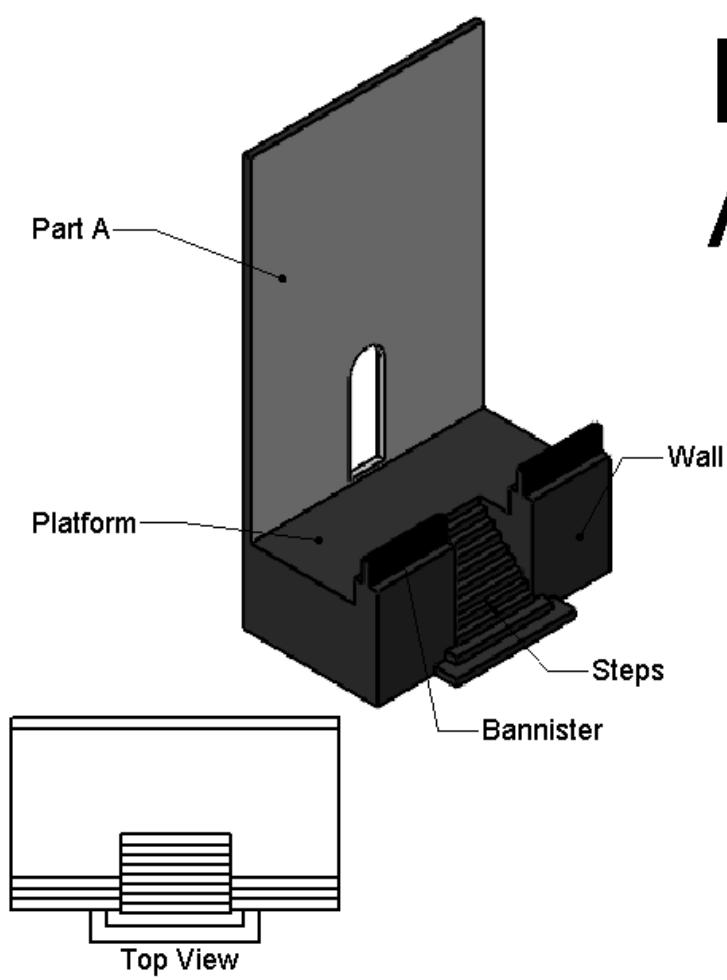
## Parts Included:

1. Wall Base x2 (6mm)
2. Wall Side x4 (6mm)
3. Wall Top x2 (6mm)
4. Wall Top Side x2 (6mm)

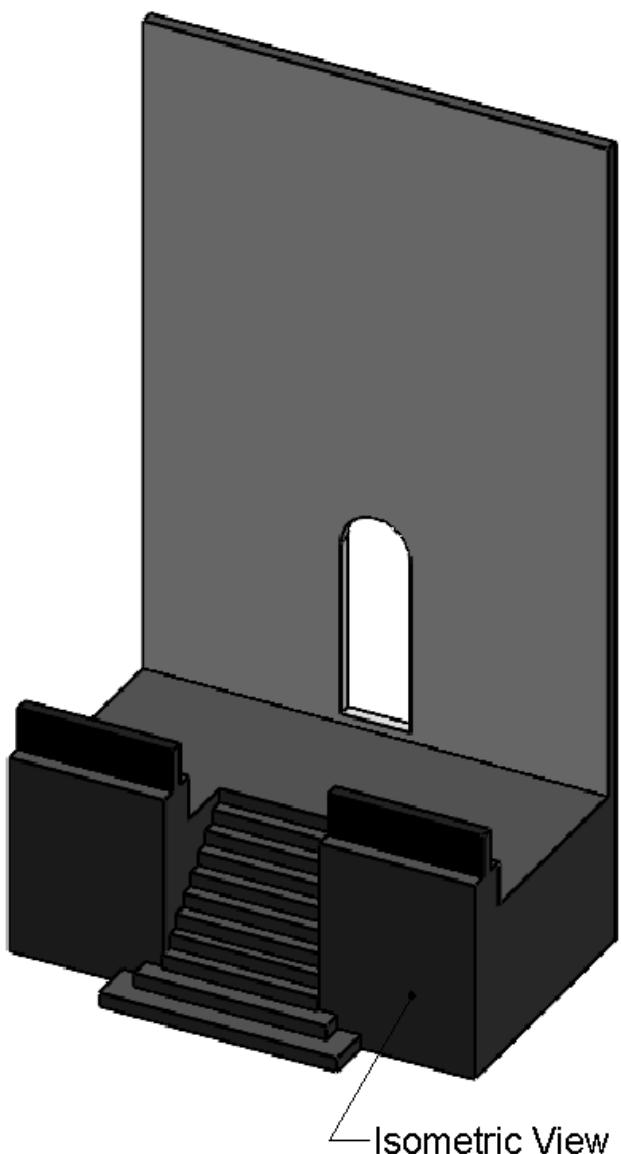
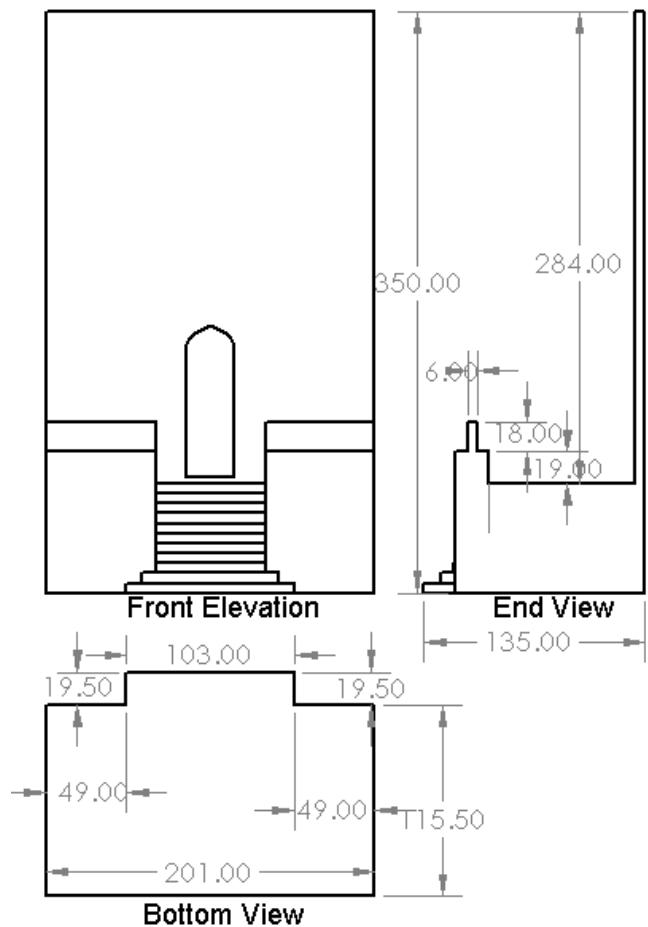


Material : 6mm MDF  
Finish: Painted Grey

# Full Frontal Assembly



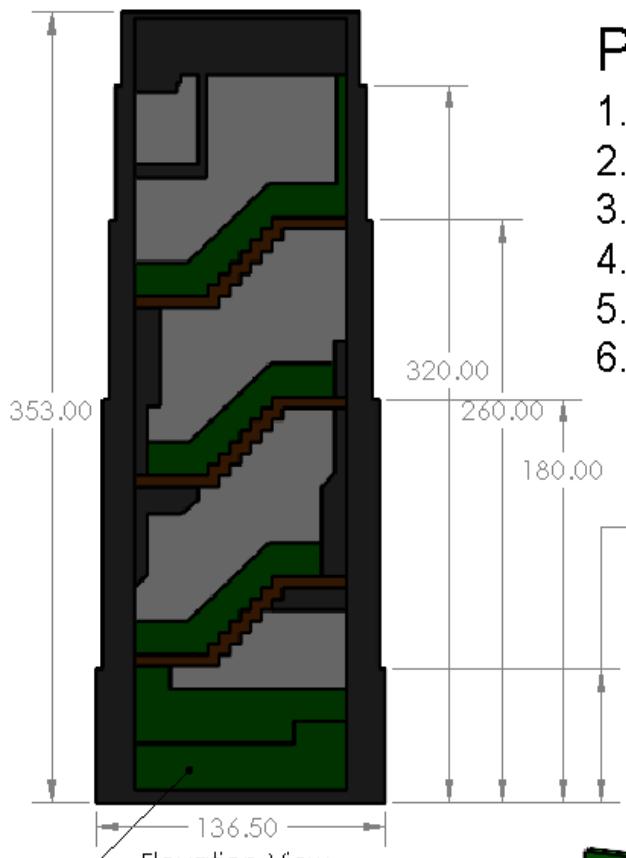
Top View



Isometric View

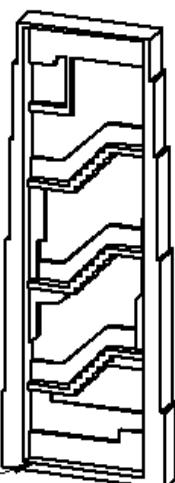
Material : 6mm MDF  
Finish: Painted Whit, Black, Grey

# Cut Section Assembly

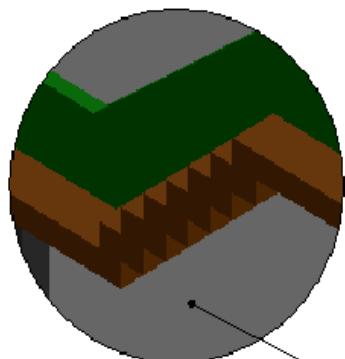
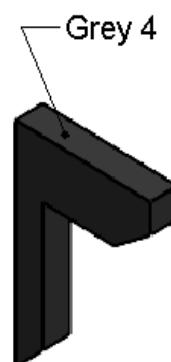
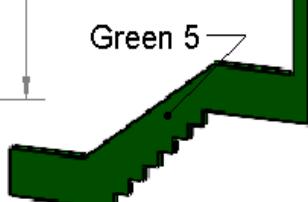


## Parts Included:

1. Stairs x6 (6mm)
2. Green 1-5 (6mm)
3. Grey 1-6 (6mm)
4. Sign (6mm)
5. D Base (6mm)
6. D Bottom (6mm)



Top Piece      D Base

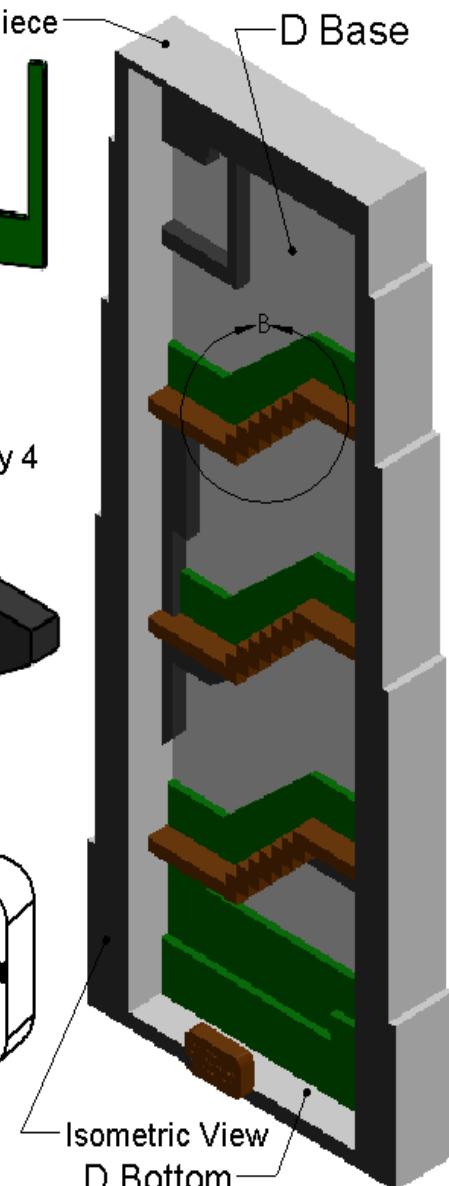
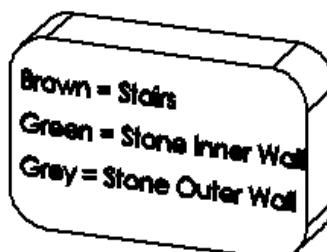


**Brown = Stairs**

**Green = Stone Inner Wall**

**Grey = Stone Outer Wall**

Sign Elevation



Material : 6mm + 3mm MDF

Finish: Painted White, Grey, Brown, Green

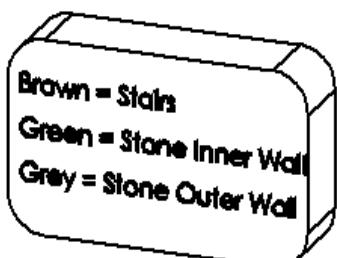
## Parts Included:

1. Sign Base (6mm)

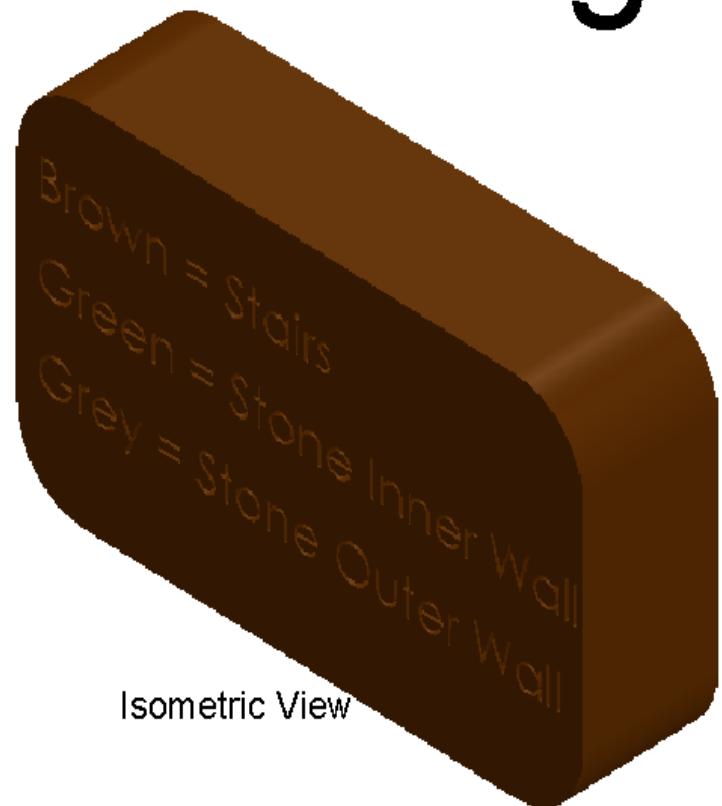
Material : 6mm MDF

Finish: Painted Brown

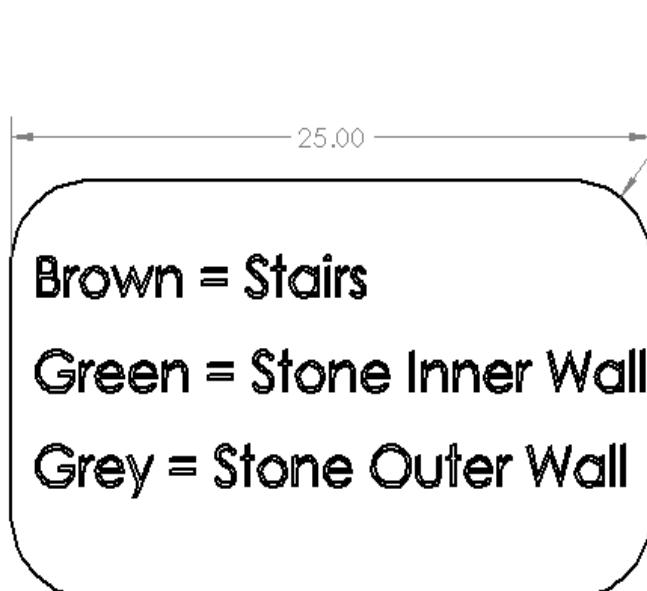
2. Engraved



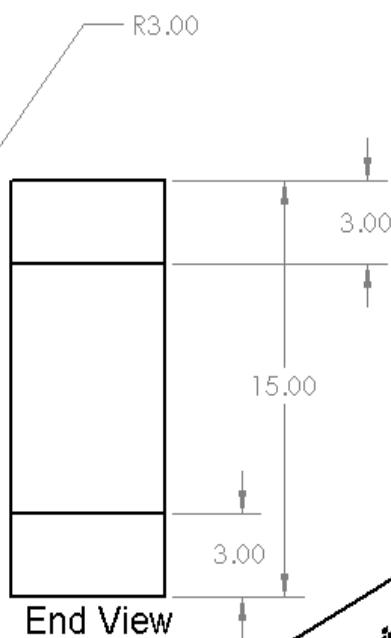
Dimetric View



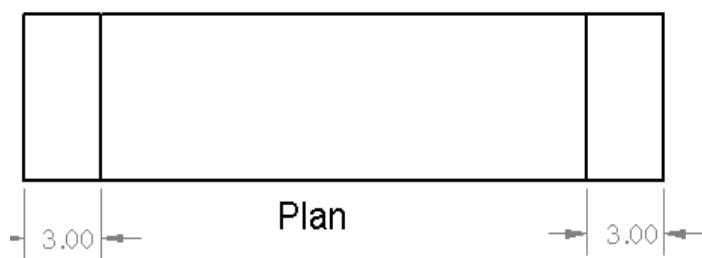
Isometric View



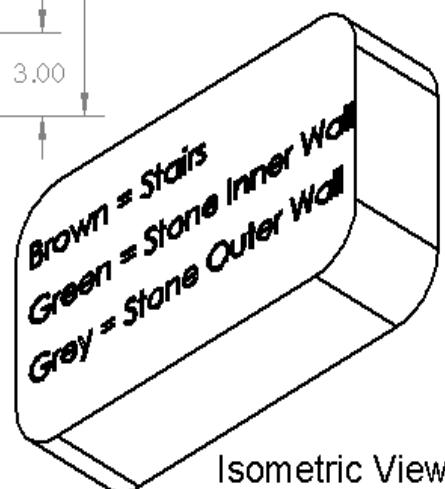
Elevation



End View



Plan



Isometric View

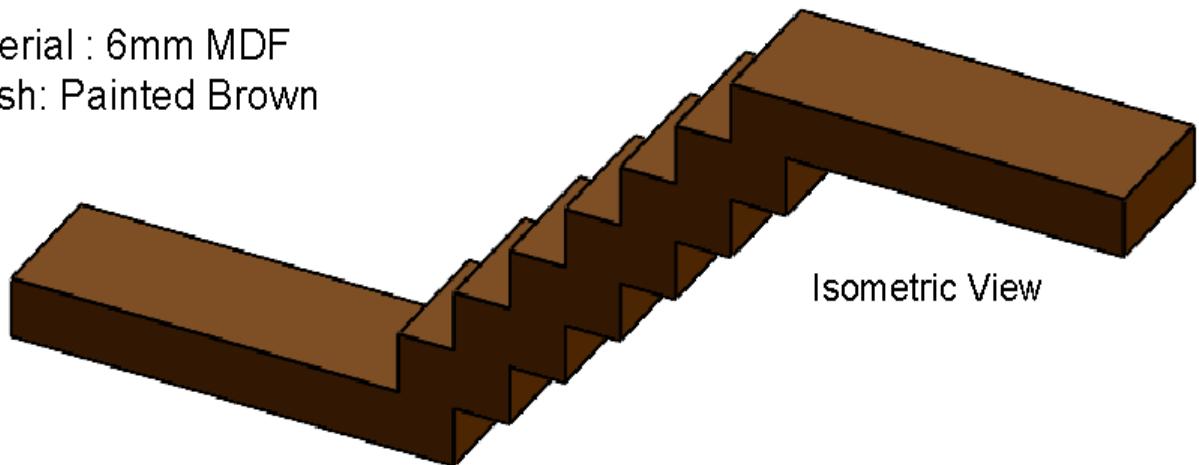
# Cut Section Stairs

## Parts Included:

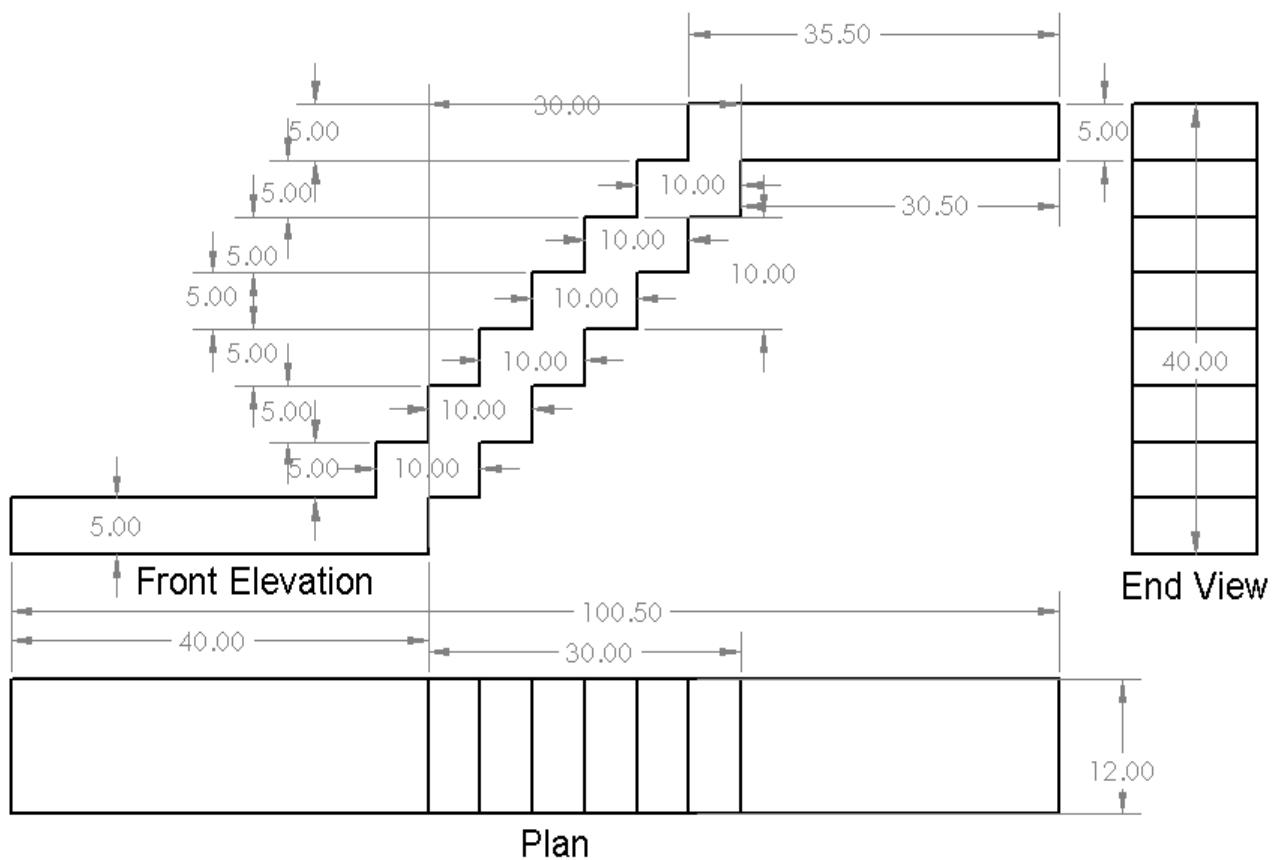
1. Stairs x4 (6mm)

Material : 6mm MDF

Finish: Painted Brown

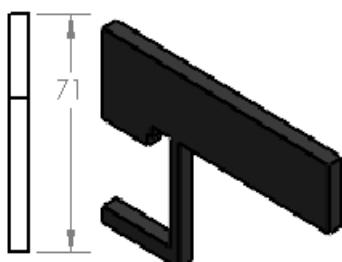
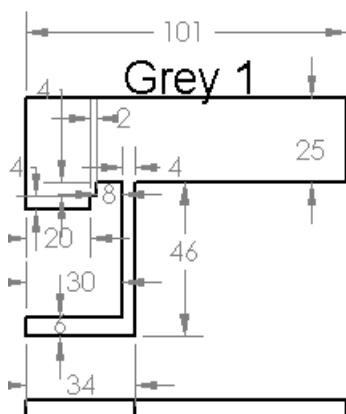


Isometric View

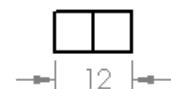
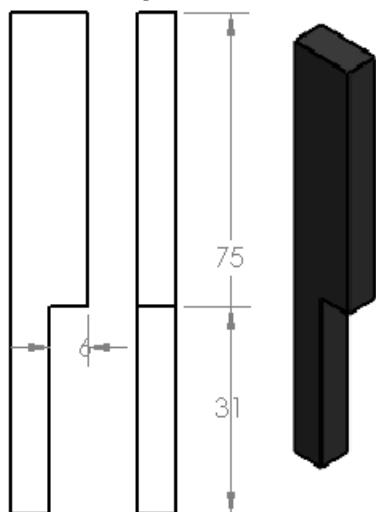


# Grey Pieces

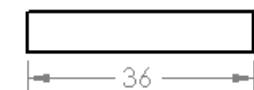
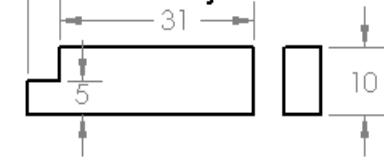
Parts Included:  
Grey 1-6 (6mm)



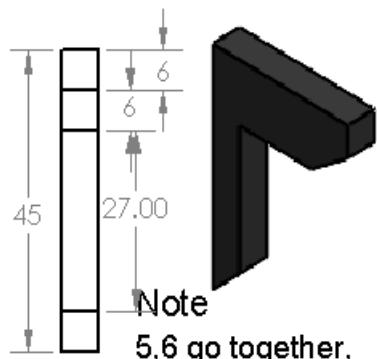
Grey 2



Grey 3

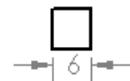
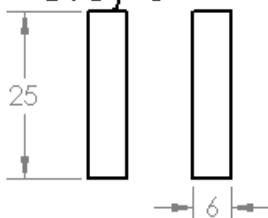


Grey 4

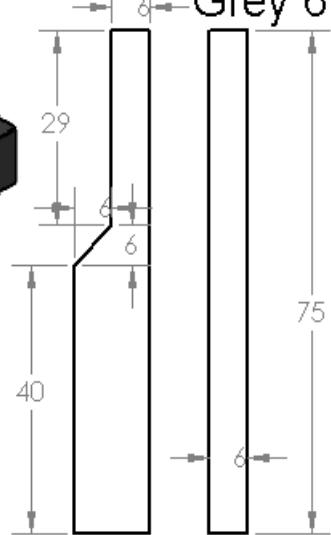


Note  
5,6 go together,  
appear as one,  
seperated via  
staircase

Grey 5



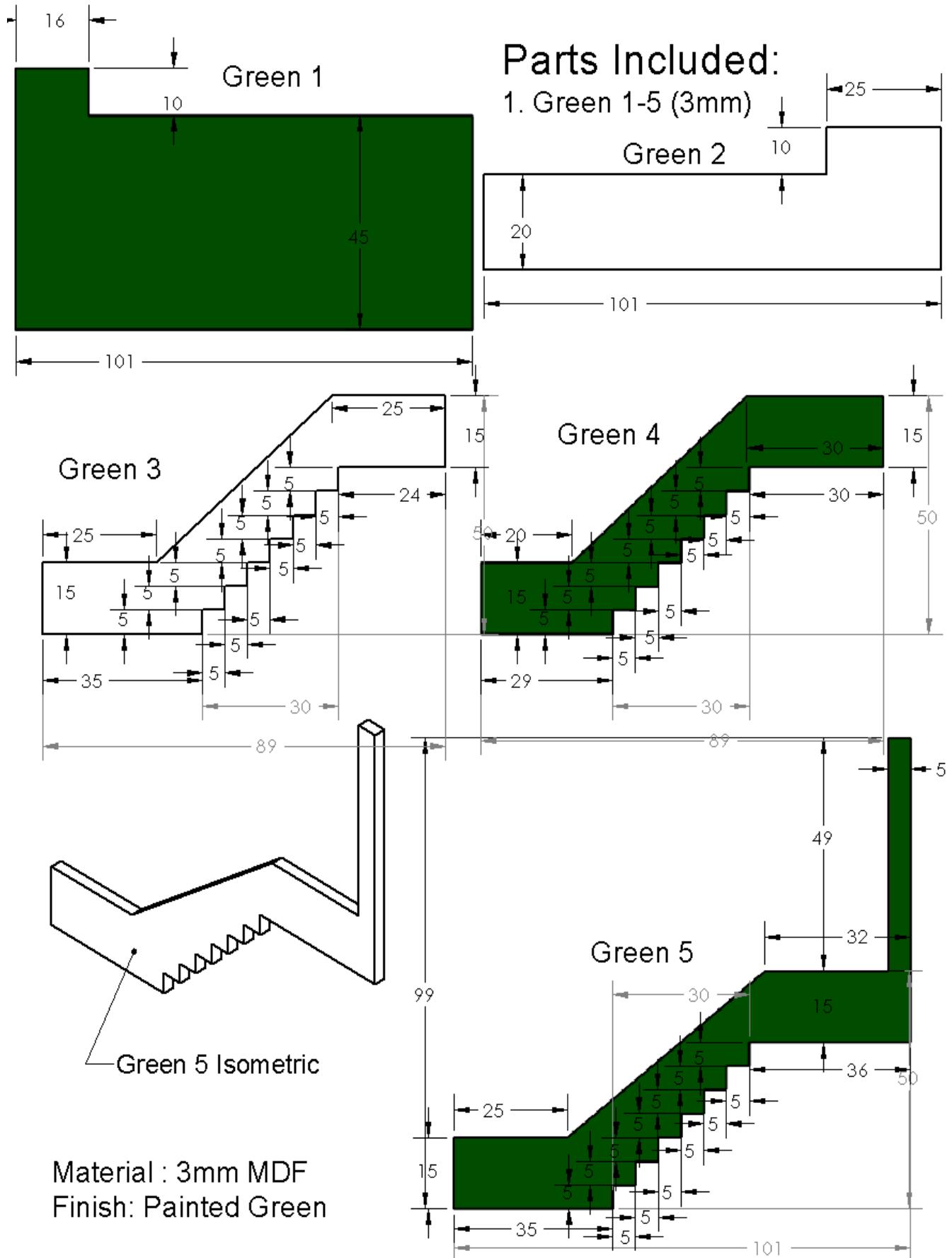
Grey 6



Material : 6mm MDF  
Finish: Painted Grey

12

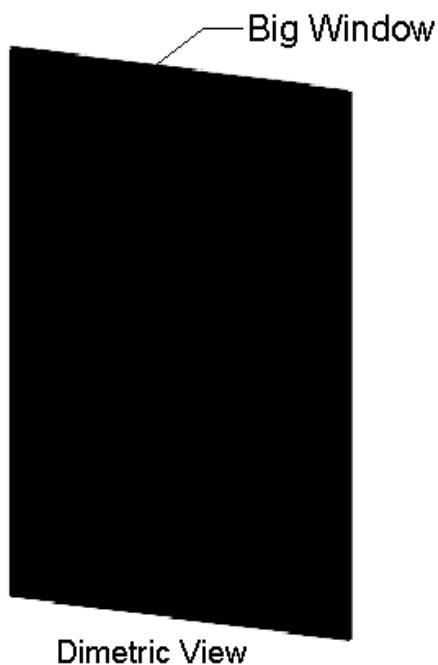
# Green Pieces



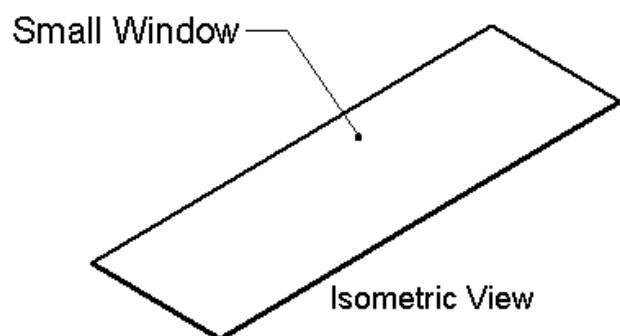
# Windows

## Parts Included:

1. Big Window (1mm)
2. Small Window (1mm)



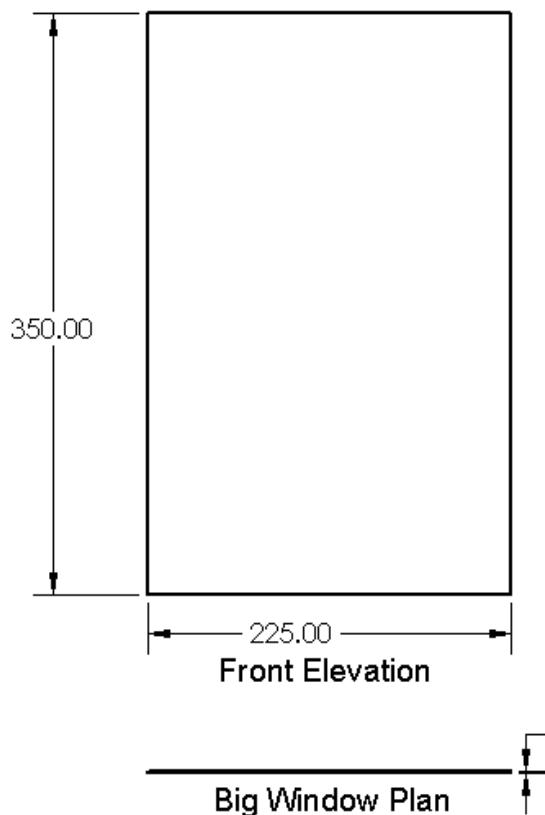
Dimetric View



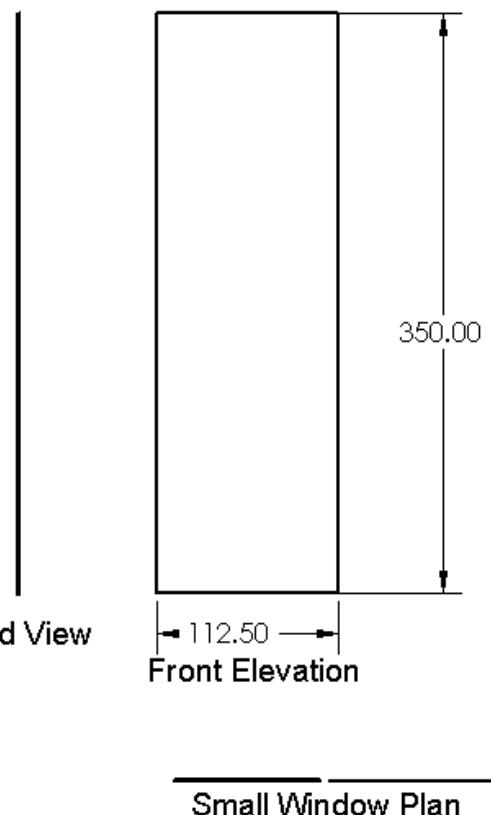
Isometric View

Material : Black Card (1mm)

Finish: Glued Down with Contact Adhesive



Front Elevation



Front Elevation



Small Window Plan

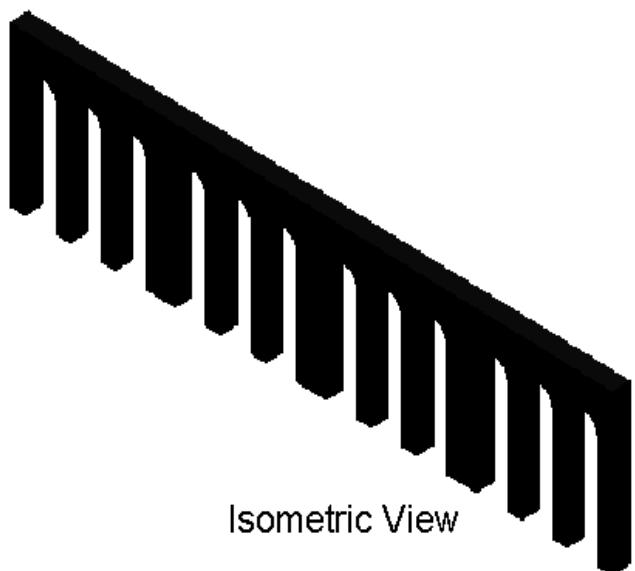
# Back External Fence

## Parts Included:

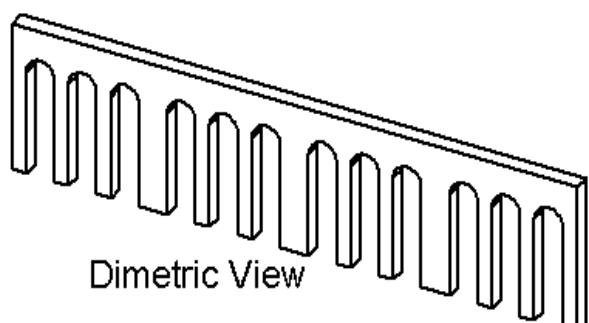
1. Back External Fence (6mm)

Material : 6mm MDF

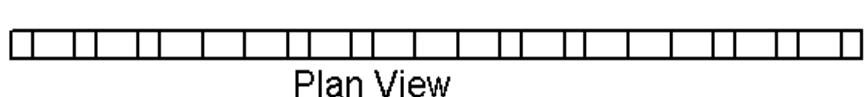
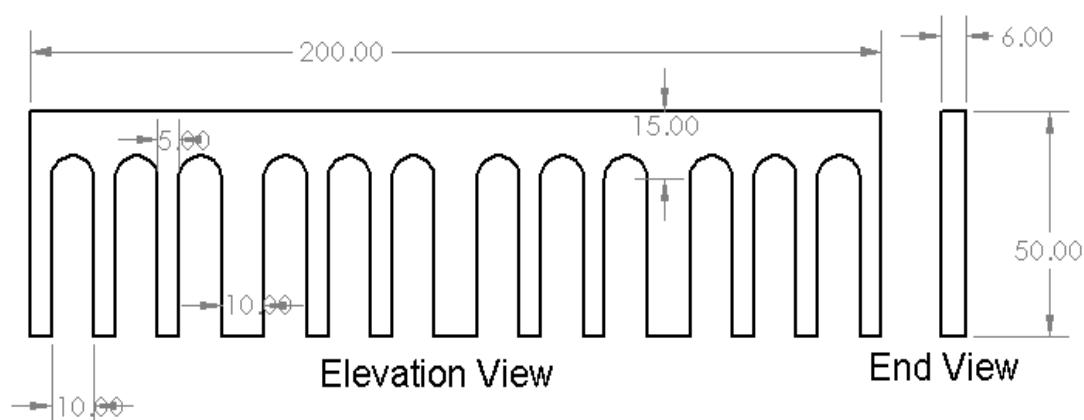
Finish: Painted Black



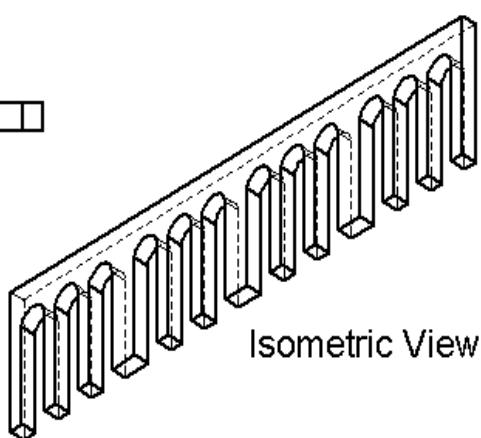
Isometric View



Dimetric View



Plan View

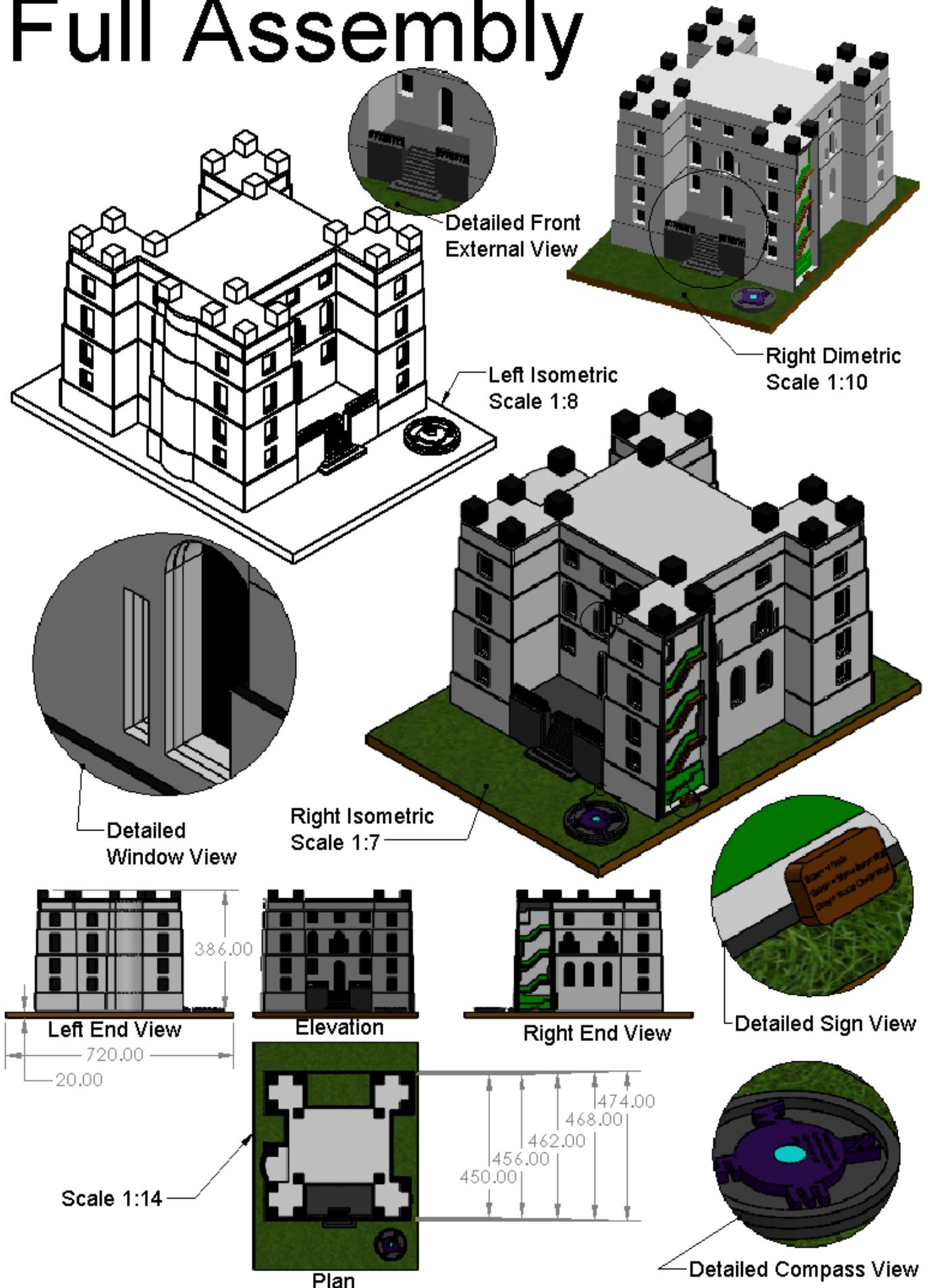


Isometric View

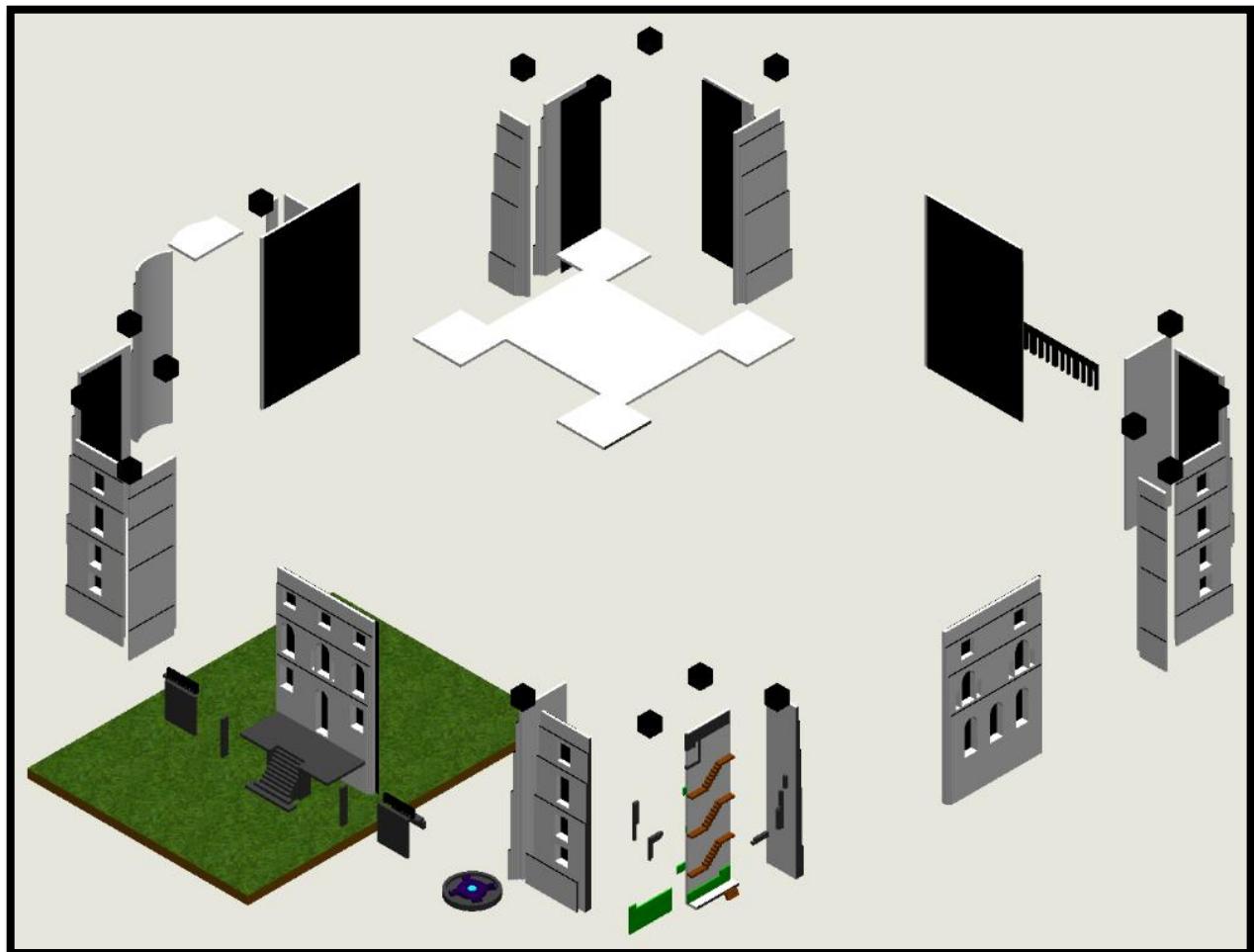
Note:

Located at the back of the castle

# Full Assembly



## Exploded View



- This assembly was made on Solidworks. With 204 components in total.

# Manufacture Plan

Tasks	September	October	November	December
Desining On Cad	◆◆◆◆◆	◆◆◆◆◆	◆◆◆◆◆	◆◆◆◆◆
Cutting Materials	◆◆◆◆◆	◆◆◆◆◆	◆◆◆◆◆	◆◆◆◆◆
Joining Pieces	◆◆◆◆◆	◆◆◆◆◆	◆◆◆◆◆	◆◆◆◆◆
Glueing Together	◆◆◆◆◆	◆◆◆◆◆	◆◆◆◆◆	◆◆◆◆◆
Sanding	◆◆◆◆◆	◆◆◆◆◆	◆◆◆◆◆	◆◆◆◆◆
Painting And Varnishing	◆◆◆◆◆	◆◆◆◆◆	◆◆◆◆◆	◆◆◆◆◆

- I used a manufacture plan to keep on track throughout the project. This allowed me to finish the project on time, to the standard that I was aiming towards.

## Cut List

- Cutting lists are used to keep track of all materials required for the project, that need to be obtained which may require ordering, waiting on delivery



# Cutting List (Main Body)

Parts	How Many (6mm thick)	Size (6mm)	Rim 1 (3mm)	Rim 2 (3mm)	Rim 3 (3mm)	Rim 4 (3mm)
A	1	350 x 225	320 x 225	260 x 219	180 x 213	
F	1	350 x 225	320 x 225	260 x 219	180 x 213	
K	1 Total:4	350 x 225	320 x 225	260 x 219	180 x 213	
P	1	350 x 225	320 x 112.5	260 x 106.5	180 x 100.5	60 x 94.5
SCMI	4	350 x 112.5	320 x 118.5	260 x 124.5	180 x 130.5	60 x 136.5
NRH	3 (1 Reverse)	350 x 106.5	320 x 115.5	260 x 121.5	180 x 127.5	60 x 133.5
TB	2	350 x 106.5	320 x 103.5	260 x 103.5	180 x 103.5	60 x 106.5
JL	2 Total:7	350 x 106.5	320 x 103.5	260 x 103.5	180 x 103.5	60 x 106.5
D	1	350 x 100.50	20 x 100.5			
E	1	350 x 70	320 x 61	260 x 58	180 x 55	60 x 52
GO	2	350 x 64	320 x 61	260 x 61	180 x 61	60 x 61
Q	1 Total 3	350 x 64	20 x 64			
X	1	350 x 58	320 x 61	260 x 61	180 x 61	60 x 61
V	1	350 x 20	320 x 23	260 x 26	180 x 29	60 x 32
U	1	350 x 10	320 x 10	260 x 10	180 x 10	60 x 10
Z	1	Card Board				

# Cutting List (Front Features)

Parts	Quantity	Measurements
Platform	1	207 x 89.5
Wall Face	2	67 x 79
Wall Sides	4	14 x 79
Wall Top	1	55 x 14
Banister Face	4	65 x 18
Banister Marker	1	67 x 6
Top Piece	1	450 x 450

### Cutting List (Front Stairs)

Parts	Quantity	Measurements
Step 1	1	103 x 59
Step 2	2	83 x 49
Step 3	4	67 x 41
Step 4	1	67 x 35
Step 5	1	67 x 30
Step 6	1	67 x 25
Step 7	1	67 x 20
Step 8	1	67 x 15
Step 9	1	67 x 10
Step 10	1	67 x 5
Stairs Back	1	67 x 60
Stairs Sides	2	25.5 x 60

### Cutting List (Cut Section)

Parts	Quantity	Measurements
Grey 1	1 (6mm)	100.5 x 71
Grey 2	1 (6mm)	12 x 75
Grey 3	1 (6mm)	35.5 x 10
Grey 4	1 (6mm)	30 x 45
Grey 5.1	1 (6mm)	6 x 25
Grey 5.2	1 (6mm)	12 x 75
Green 1	1 (3mm)	100.5 x 30
Green 2	1 (6mm)	100.5 x 55
Green 3	1 (3mm)	88.5 x 50
Green 4	1 (3mm)	88.5 x 50
Green 5	1 (3mm)	100.5 x 99
Brown Steps	6 (3mm)	100.5 x 40
Sign	1 (6mm)	25 x 15

### Cutting List (Back Features)

Parts	Quantity	Measurements
Fence	1	200 x 50

### Cutting List (Windows)

Parts	Quantity	Measurements
Type I	1	350 x 225
Type II	2	350 x 122.5

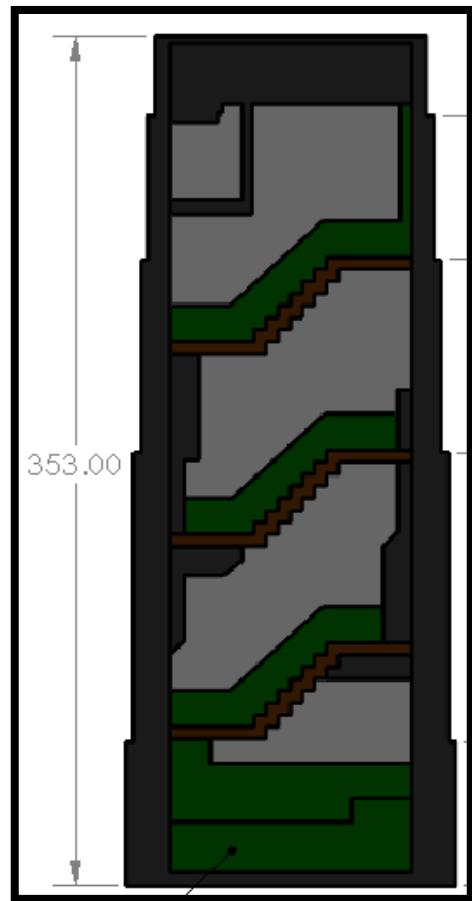
### Cutting List (Toppers)

Parts	Quantity	Measurements
Toppers	18	30 x 20 x 30

### Cutting List (Artificial Grass)

Parts	Quantity	Measurements
Artifical Grass	1 roll	1 roll

## Cut Section



Brown = Stairs

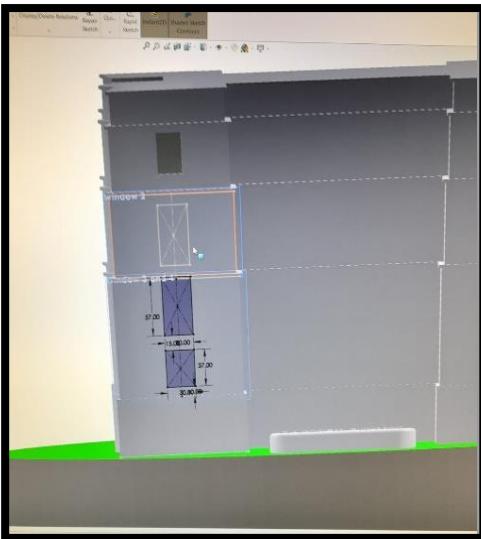
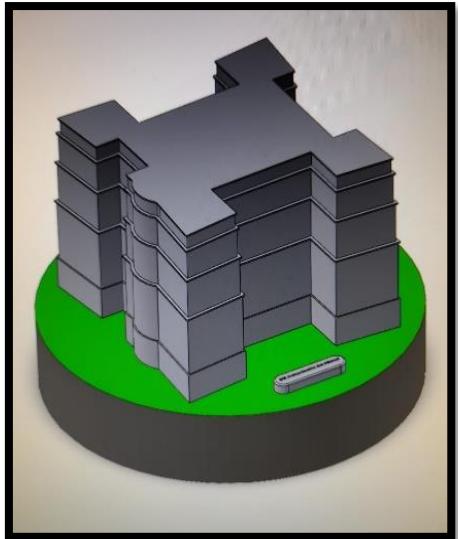
Grey = Outer Stone Wall

Green = Inner Stone Wall

# **Assembly - Project Execution**

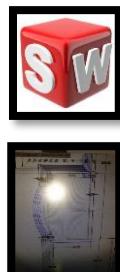
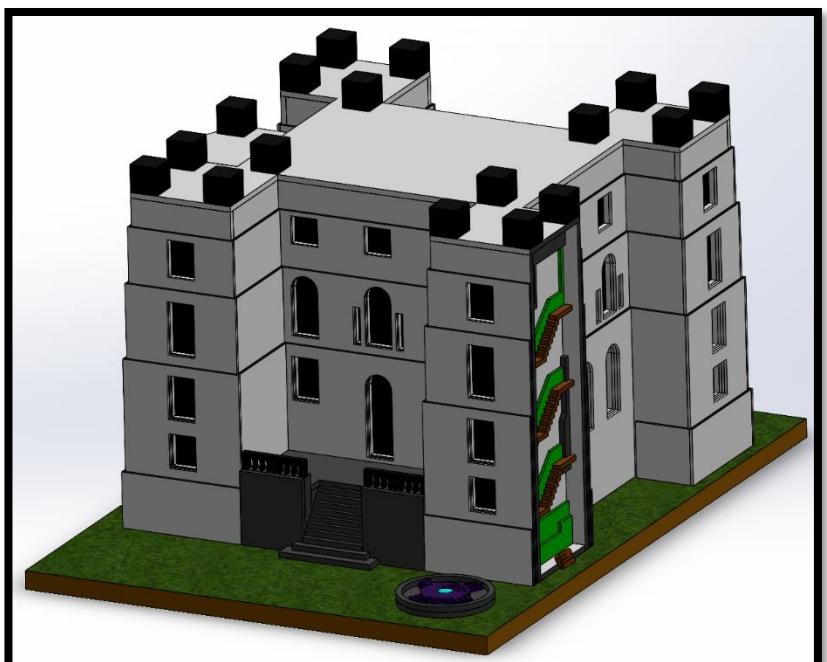
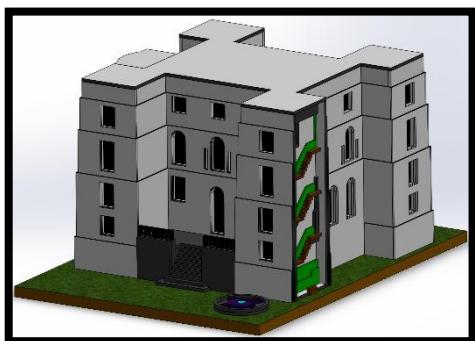
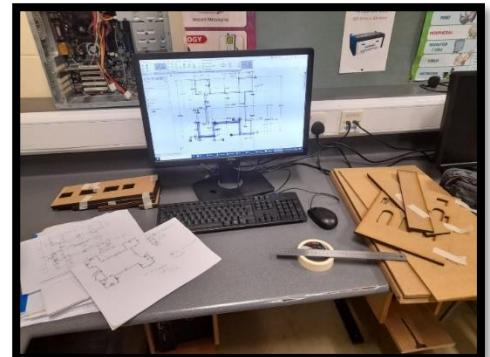
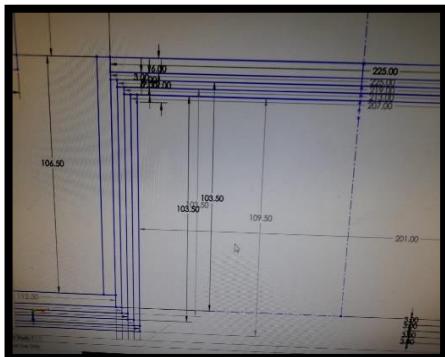
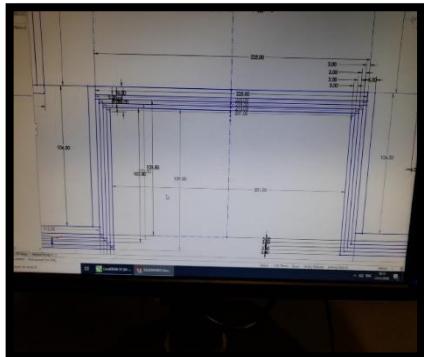
- Due to the large number of components that fabricate together to form my heritage model, I devised my execution into 18 stages.
1. Design and Planning
  2. Cutting
  3. Gluing
  4. Sanding
  5. Touch Ups
  6. Front Externals
  7. Top Piece
  8. Curve Piece
  9. Spray Painting
  10. Painting
  11. Windows
  12. Gluing Top Piece
  13. Cut Section
  14. External Lining
  15. Toppers
  16. Compass & External Fence
  17. Natural Elements
  18. Lamp Posts

# Designing Stage



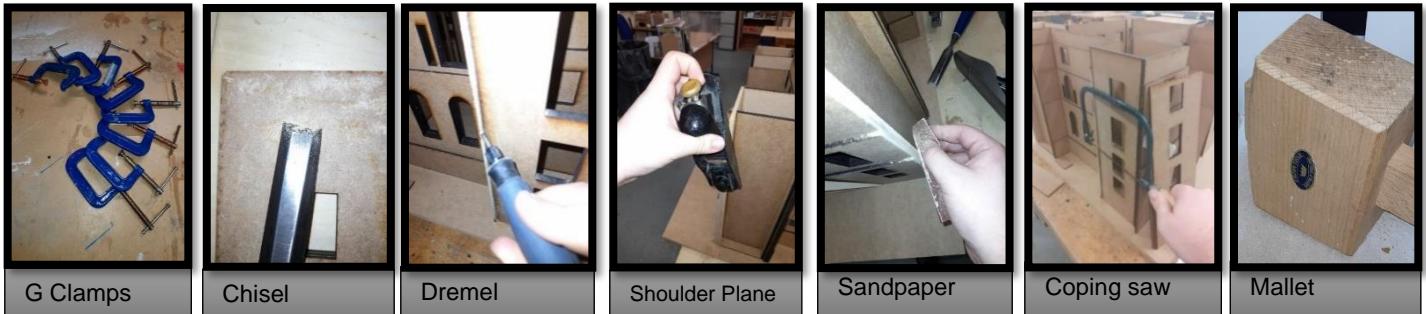
Throughout the designing stage, I made several models to help me decide on the different proportions and aspects I wanted to use. I also did full scale drawings on paper and card.

This allowed me to know how many pieces I would require, i.e. how much wood to order, other supplies to obtain e.g. different paints.



# Equipment

## Hand Held Tools



## Tools



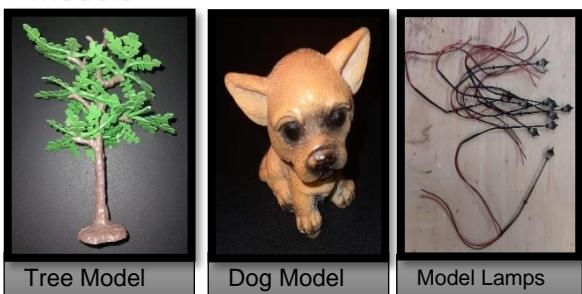
## Chemicals



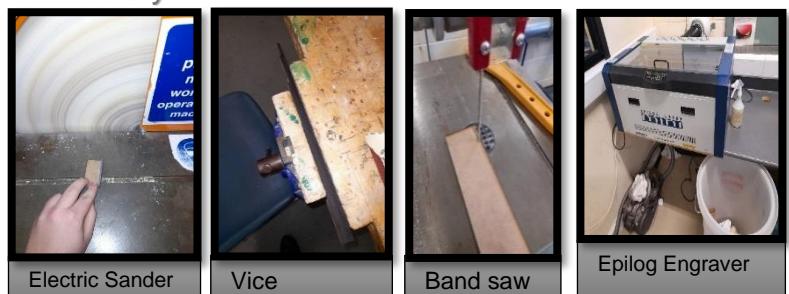
## Materials



## Models



## Machinery



# Storing Components & Materials



For most of my project, I had MDF Sheets cut into 600 x 300 to fit into the laser bed for the cutting process.



When storing my smaller sets of pieces, I kept them all in a designated locker for 6<sup>th</sup> years.

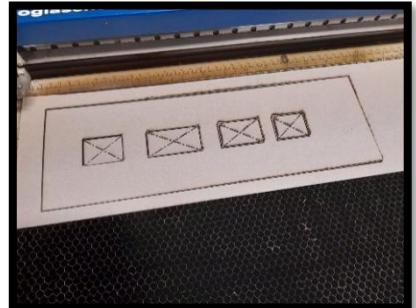


As I positioned pieces together using masking tape, I was able to keep track of which piece was which, and to where it would be joined, as every piece has only one correct position.



As my project got further along the assembly process, I then had to leave it on a table off to the side due to its size and weight.

## Execution – Cutting



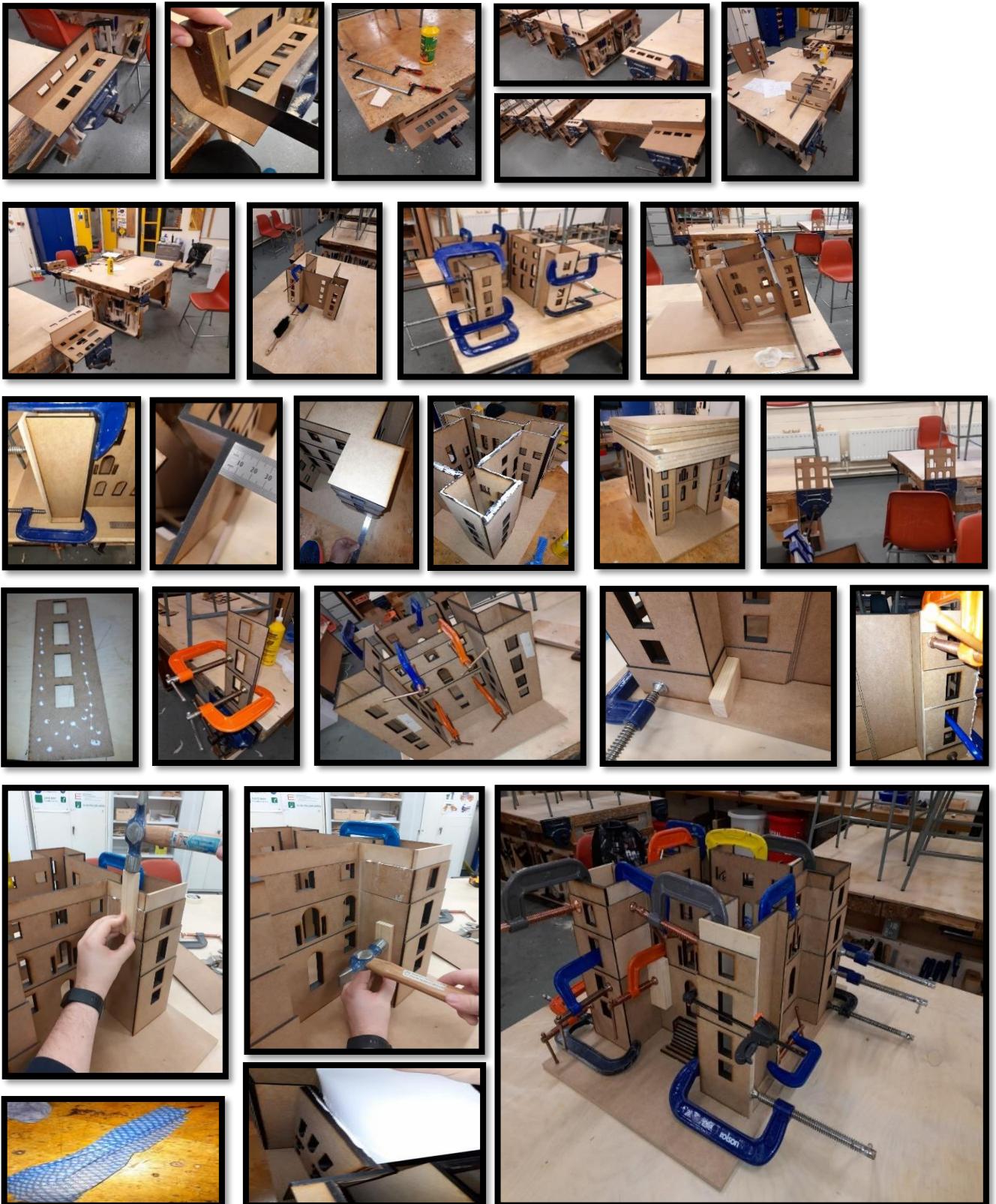
For the main body of my project, I cut pieces using the Epilog engraver utilising my CAD drawings from the software solid works that were converted into DXF files for Corel Draw, where possible I tried to reuse old / broken pieces of wood found in the waste bin.



For some pieces, they were cut out or trimmed using the band saw or hand saw

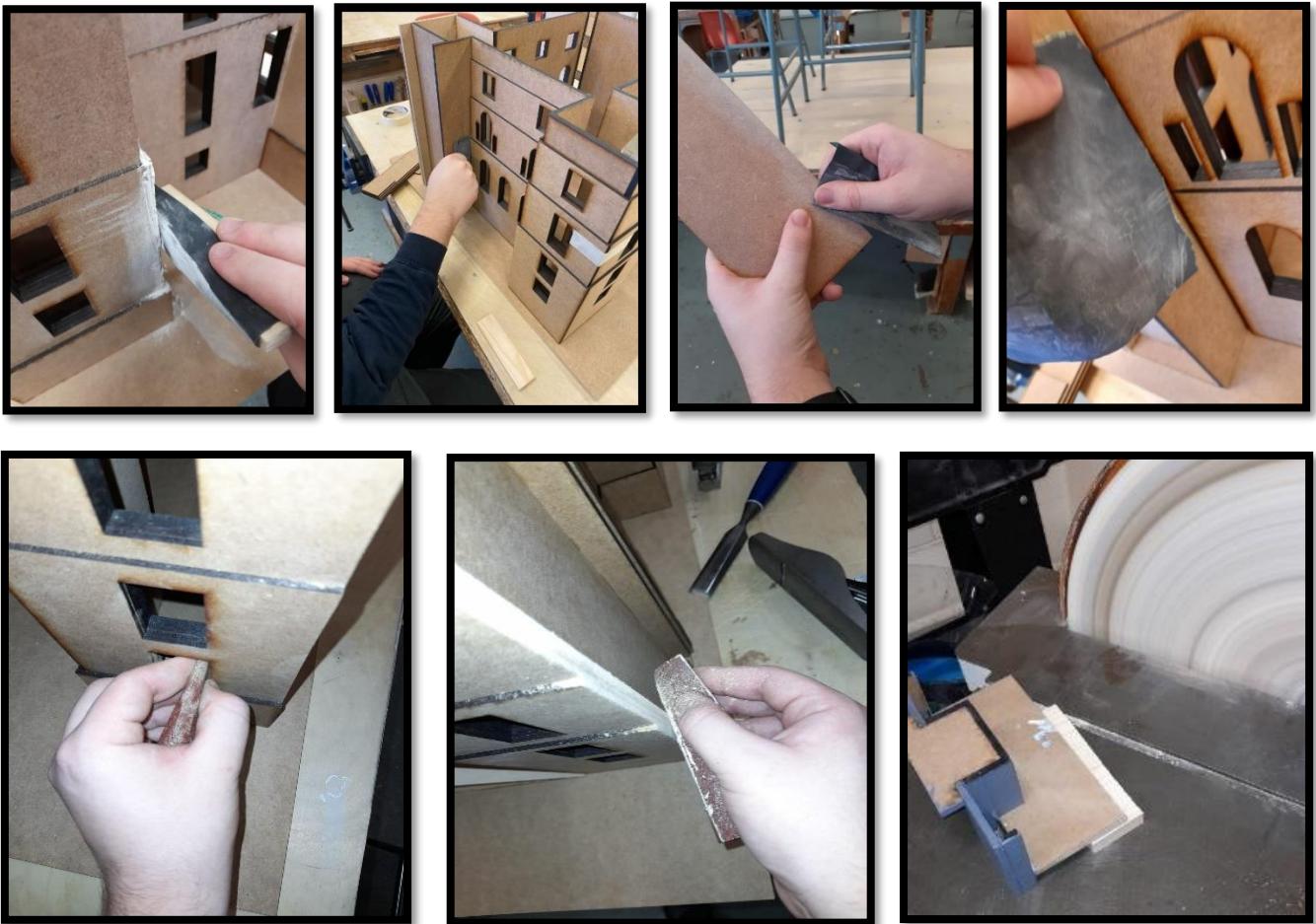


## Execution – Gluing



The gluing process went over several weeks due to the vast amount of pieces that need to set before the next piece was attached. To combat this, I grouped pieces into smaller assemblies that I then glued down together with the use of clamps and wood glue.

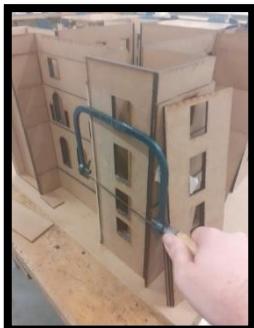
## Execution – Sanding



Sanding plays a key role when trying to get pieces to align and fit correctly. This can be done manually with black and red sandpaper of different grits, or mechanical using a rotating sander.

Due to safety requirements, when working with MDF dust, only small bits of dust can accumulate before swept up, eye protection and a mask must be worn at all times, and must work next to an extraction unit/ air flow to keep the dust out of my lungs.

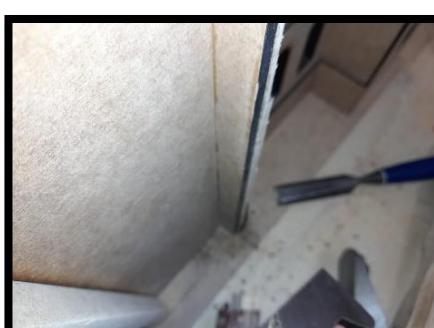
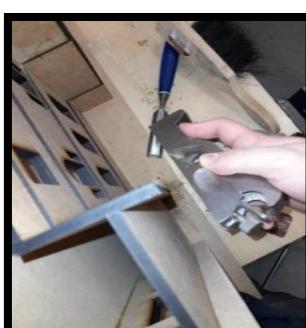
# Execution - Touch Ups



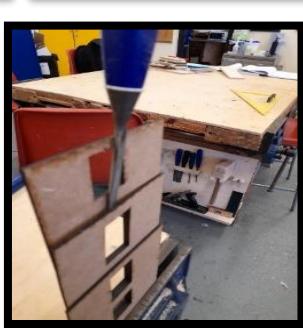
Throughout the assembly, human error in gluing everything together, may result in pieces not aligning correctly, which puts the entire model off like dominos. To combat this, I needed to touch up pieces via chiseling and sanding to get parts flush with each other.



This involved numerous skills such as planning, chiseling, engraving, sanding and sawing to obtain the correct finish.



When using the shoulder Plane and chisel I needed to push downwards, but ensuring I kept a safe distance encase of injury.

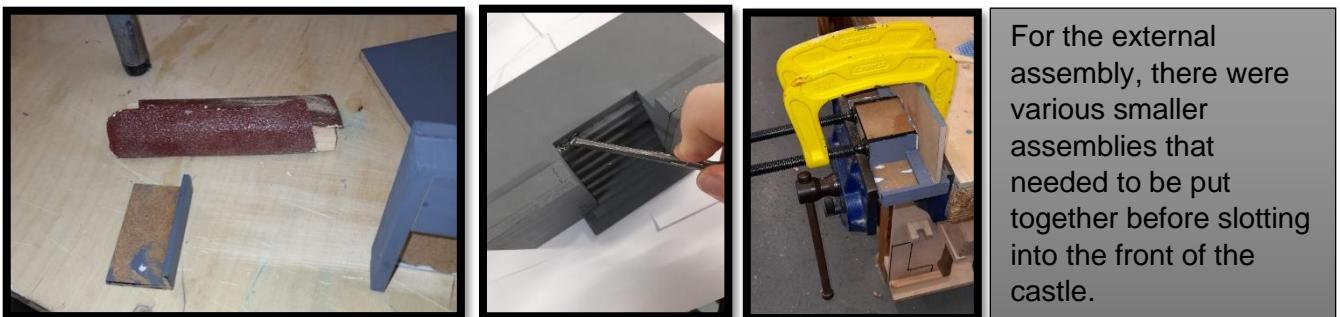


When some gluing went not according to plan, I was able to separate the piece using a chisel and then chisel off the dried glue before regluing the pieces back together correctly.



For some tighter pieces e.g. when they were enclosed at a corner, there wasn't enough wiggle room to get the pieces in without causing a different glue to bust, so using the bandsaw I cut off a small strip, in doing so caused a few mm to be taken off from the blade which then provided enough space to fit in tight,

# Execution – Externals

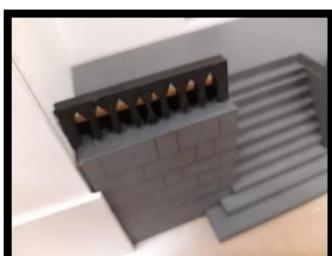


For the external assembly, there were various smaller assemblies that needed to be put together before slotting into the front of the castle.

When trying to slot the piece in I needed to take these side pieces off. Using the chisel and mallet, I paired them off till smooth before slotting the front assembly in.



Some minor sanding was done to get a nice fit using the electric sander, with the extractor close by taking in the dust. I placed a piece of wood under the assembly to keep it flat.



After gluing in the frontal assembly, I used hot glue and small markers to glue the bannisters



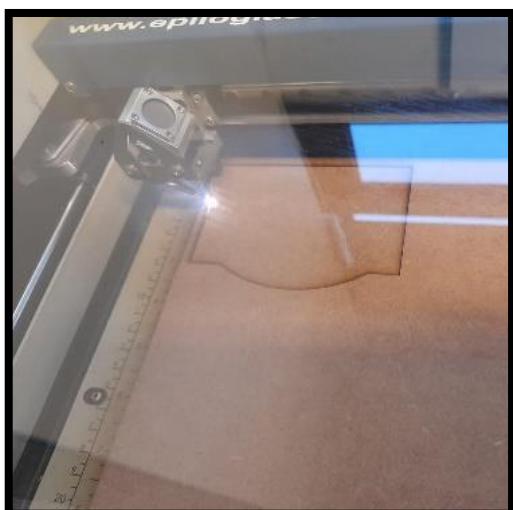
## Execution - Top Piece



After the top piece was sprayed, I then needed to fit it onto the top, this involved marking it out and cutting to fit.

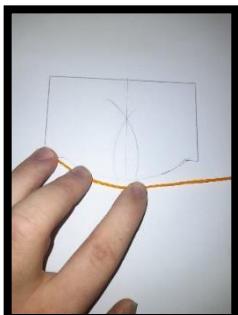


I then had to chisel off the excess, smooth things out, to obtain a good finish.

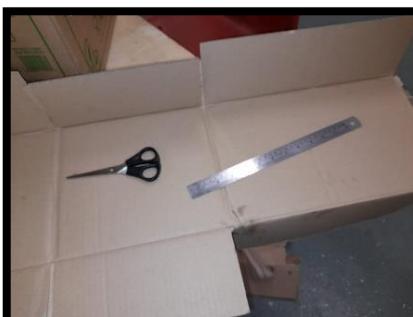


Lastly, I cut out the curved section top piece, which was also sprayed, touched up to fit correctly, a combination of glue, wood filler and paint was used to adjust the gap to the cardboard layer.

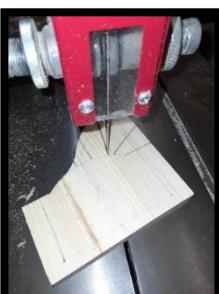
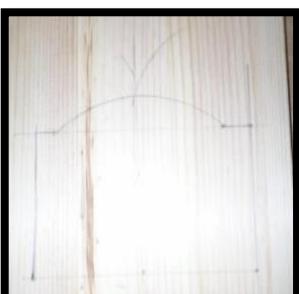
# Execution – Curve Piece



For the curved section, after bendy plywood was deemed too difficult, I decided to recycle some cardboard from the cafeteria. To find the curved length needed I drew out my drawing on paper, using a piece of string I then measured it.



Using the measurements, I then marked out the curved section before cutting it out, start bending it to fit.

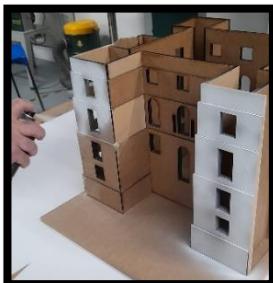


Using the previous drawing on pieces of waste wood, I then cut out my marker pieces for the curved section to rest on / bend

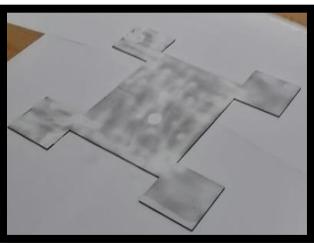


I then glued the curved section down with the use of hot glue, bottom marker and wood filler to fix the gaps.

# Execution – Spray Painting



The main body is very large, so I decided to use spray paint, due to safety reasons I always

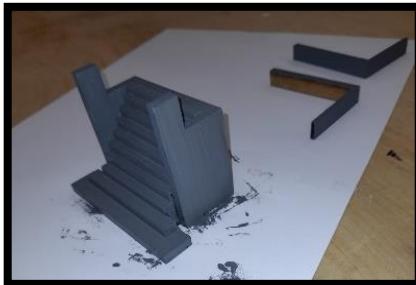


The top piece was painted separately, glued together later.

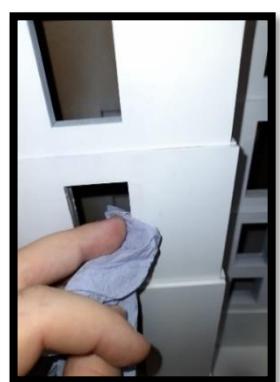
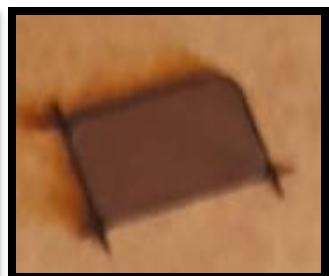


To get a clean and even coat, I needed to do several coats over the duration of a week, giving time to dry before applying the next.

# Execution – Painting



There was a large amount of small painting that needed to be done for different features of the project.



After finishing all the spray painting, I then needed to go around all the windows and paint the inner profiles due to spray paint not reaching, as excess concentrated paint trying to fill them areas causing a rippling effect that is not desired.

## Execution - Windows



For the windows, I first cut a piece for Window type I and II ensuring that they fit into their respected places along the walls.



After the pieces were cut to fit, I then cut copies of the different sheets.



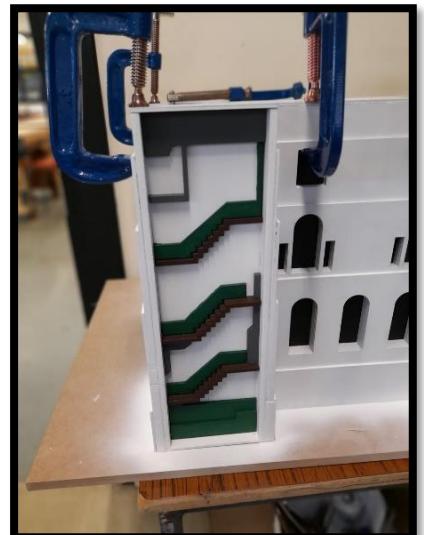
I applied contact adhesive to the pieces. I used card, tissue to ensure only getting glue around the outside so that it does not show in the centre (Window)



I then waited a few minutes for the adhesive to become touch dry before applying pressure to the walls to set.



## Execution – Gluing Top Piece



The top piece was glued down with the use of G clamps, unlike the bottom, using drawing boards for weight, and with the use of a single clamp on its side to press down on the curved top piece.

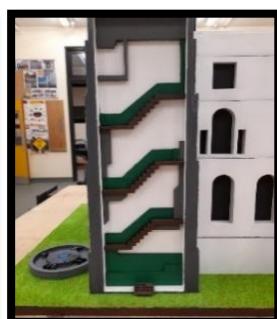


After the top piece was glued down, I then applied wood filler to the edged that has gaps, which were then painted for a nice finish.

## Execution - Cut Section



The cut section is a big part of my project to show an in-depth look at the castle and its inner workings. Using real references, I designed a model on CAD and then cut the pieces out, accordingly, painted and glued them into place.

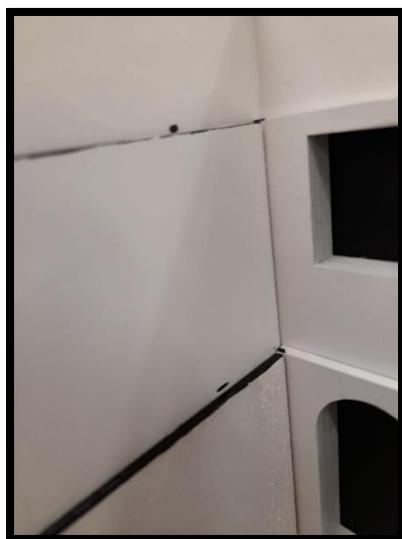
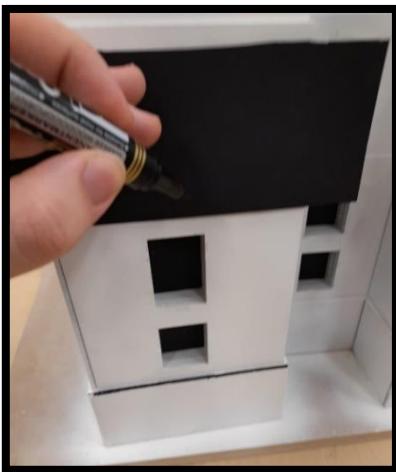


I added a little key at the bottom that has engravings of the different layers which was then hot glued to the base.

## Execution – External Lining

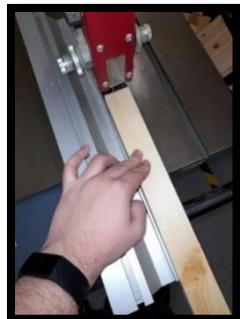


After all the spray paint is finished, I then added the external black lining that can be seen on the castle, to do this I used a black permanent marker and a piece of card to protect the white walls from getting coloured.

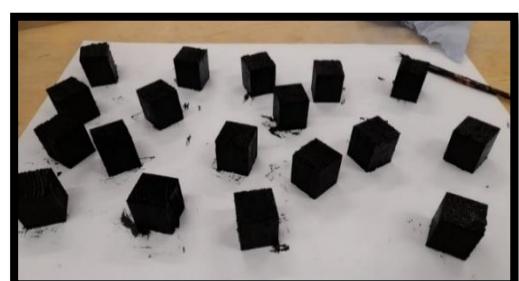
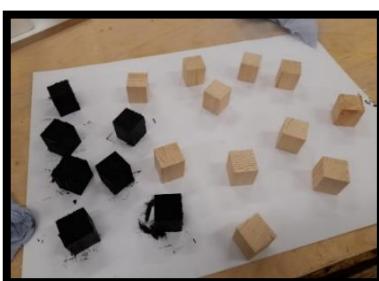


After I finished all the external lining, I then needed to touch up mistakes with white paint and a fine paint brush.

## Execution - Toppers



I marked out a piece of wood and cut the entire piece to length, then setting up the band saws guard to my second length, I cut the rest of my pieces, making them all the exact same size.

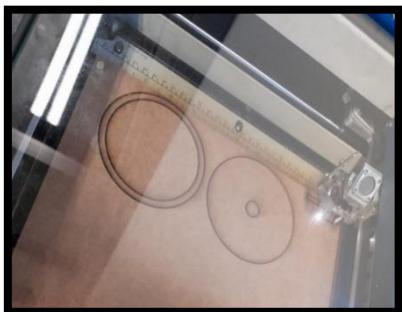


I then dusted off all the splinters and wood chips that were caused by the band saw. Then I started painting all the pieces black and allowing them to dry.



After all the pieces had dried, I applied wood glue to all the pieces, placed them in their individual places and then applied weight using drawing boards to apply pressure.

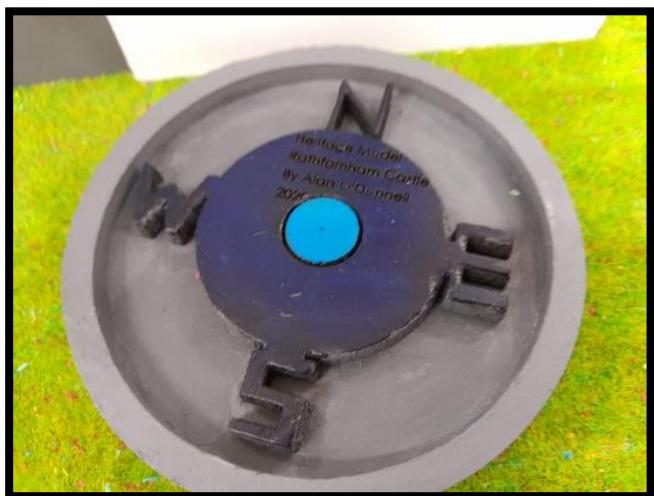
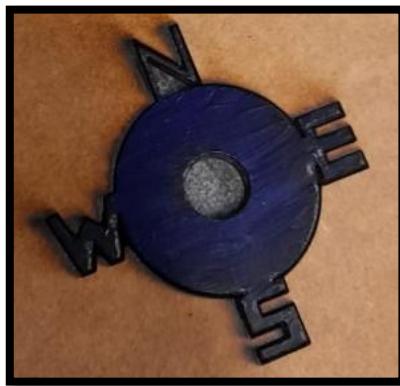
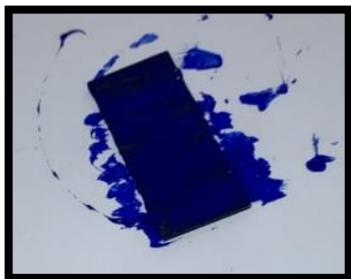
# Execution – Compass + External Fence



The pieces were:

1. Sketched on paper.
2. Drawn out on solid works.
3. Saved as DXF files.
4. Loaded into Corel Draw.
5. Cut out using the Epilogue Engraver.

6. Painted designated colours.
7. Engraved Writing
8. Glued together.
9. Touch up paint



# Execution – Natural Elements



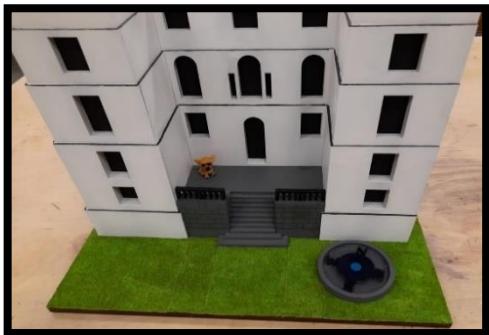
Before gluing down the artificial grass, I painted a base coat in green paint in case of holes, missing patches in the fabric. After the green paint was finished, I then added the “Dirt Layer” using brown paint.



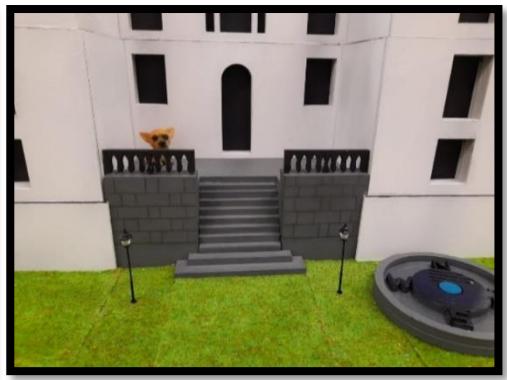
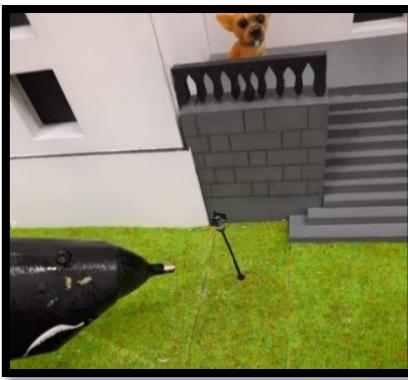
Method for attaching the artificial grass:

1. Unwrap the artificial Grass
2. Using a T square and pencil, I marked out different strips of fabric.
3. I then applied glue to the base, then pressed down on the fabric allowing it to glue in place.
4. Using a scissors and Stanley Knife I then cut off all of the excess material around the base.

# Execution – Lamp Posts



To implant the lampposts that I ordered off Amazon, I marked out 2 holes roughly parallel to each other, and then drilled holes using a hand drill.



After drilling the holes, I then place the two lampposts in to check they fit, then by lifting them partially out, applied the hot glue before pulling them back down to dry in place. This left a great finished look, with no remaining waste to be seen.

# Final Touches

After I finished executing the assembly, there was some small adjustments that needed to be done, this included, touching up paint, filling any cracks and adjusting black lines.

# Full Time Lapse



# **Health & Safety**

## **In the workshop**

1. Always wear a mask in the workshop.
2. Wear eye protection while working (Glasses).
3. When using machinery wear ear protection (plugs).
4. Have loose clothes and hair tied up, so it does not interfere with the project/machinery.
5. Always keep your fingers away from blades, chisel away from your body.
6. Ensure blades are not blunt or damaged.
7. Ensure all tools and machinery are functioning properly.
8. When spray painting, ensuring a constant airflow for ventilation and respiratory protection as vapours are harmful. Spray at the project, from a safe distance so the aerosol does not get on you or breathe it in. Also, avoid working near flames, large heat sources as can cause bursting/sparks.
9. When working with MDF, stay near an extraction unit to suck in the dust, as MDF contains formaldehyde, which can cause irritation of the eyes, nose and throat, and can also cause nasal cancer. To prevent this, constant use of an extraction unit and wearing masks is mandatory for safety protection.
10. When using the hot glue gun, I ensured my fingers were a safe distance away and was always near a tap in case of any burns.
11. When using the Stanley knife to touch up the artificial grass, due to it being very sharp, I gave it back to my teacher whenever not in use to prevent any accidents.



## **On Site**

1. Call the office beforehand to check visiting restrictions.
2. Socially distance from other people.
3. Wear a mask when necessary.
4. Sanitise hands before and after visit.

# Environmental Impact

## Rathfarnham Castle:

- Due to large masses of tourism, there is enormous pressure placed on the area, which can lead to soil erosion and increased pollution.

## My Project:

- No Materials were wasted, I constantly reused left over pieces that were left in the wood materials bin.
- I used recycled cardboard for my curve section, cardboard model.
- For my toppers and marking pieces, I took wood from the recycling bin.
- All materials chosen were sustainable and environmentally friendly, which can all be recycled again.
- Throughout the manufacturing process I used a lot of electrical equipment due to cutting out all the small pieces by hand would take too long, causing me not to finish, when relying on non-reusable sources of energy it affects the environment negatively.



# Evaluation

## Quality of planning

- When completing my project, I think it went according to plan. Luckily enough I had most of the project finished before the Covid-19 lockdowns got in the way. I planned on solid works every single piece I would need. This allowed me to know how much materials I would require for that given week. Then at the weekend, I would plan the next batch for the following week. I kept note of this on an excel spreadsheet.



## Quality of finish

- I believe that the quality of the finish is to a high standard, with all the pieces slotting together correctly all at even heights. Rough edges were smoothed and touched up before various paints were applied.



## Quality of assembly

- As I progressed through the assembly, it got harder to execute due to the complicated and tedious gluing positions that if too much pressure was applied could break apart. The quality of the final assembly is sturdy and smooth. My joints were all butt joints, chosen due to how thin in size they are (3-6mm), they fit in tight together and look well.

## Quality of cut section

- The cut section is a big part of the project, as it gives an insight into how the internal affairs of the castle were designed and functioned. I think it turned out very well.



# Conclusion

- After finishing my project, and reflecting on what I have learned, I have gained a greater understanding of Irish heritage.



- Throughout the project, I developed my CAD skills, which then assisted me in my DCG projects going forward. I also gained a lot of practical experience when working on different features due to all the different techniques, tools and processes that were being used throughout the project.

- Throughout the project, I started to appreciate what it means to have strong project management. This meant that I wouldn't be wasting any class time, got right to it as soon as the bell rang.



# Bibliography

## Materials:

- Plywood, MDF, Artificial Grass, Paints – Mr Murphy, Wesley College.

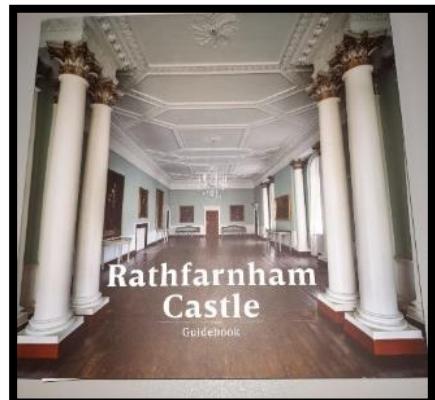


## Model Lamps:

- [https://www.amazon.co.uk/Baoblaze-Miniature-Street-Accessories-Railway/dp/B07MXDJ1TN/ref=sr\\_1\\_82?dchild=1&keywords=LED+street+lamp+model+railway&qid=1609948538&sr=8-82](https://www.amazon.co.uk/Baoblaze-Miniature-Street-Accessories-Railway/dp/B07MXDJ1TN/ref=sr_1_82?dchild=1&keywords=LED+street+lamp+model+railway&qid=1609948538&sr=8-82)

## History:

- [https://en.wikipedia.org/wiki/Rathfarnham\\_Castle](https://en.wikipedia.org/wiki/Rathfarnham_Castle)
- <http://rathfarnhamcastle.ie/the-castle/>
- <http://www.t4.ie/>
- Rathfarnham Castle Guidebook



## Images:

- [https://www.google.com/search?q=rathfarnham+castle&safe=strict&rlz=1C1GC\\_EJ\\_enIE915IE915&sxsrf=ALeKk032FQatElBpM5zuczVh10huldtMnA:1610468609540&source=lnms&tbs=isch&sa=X&ved=2ahUKEwjGy5KL55buAhVSuXEKHUmpDAcQ\\_AUoAnoECBIQBA&biw=1778&bih=813#imgrc=1loZJGu7zVK6MAABAR](https://www.google.com/search?q=rathfarnham+castle&safe=strict&rlz=1C1GC_EJ_enIE915IE915&sxsrf=ALeKk032FQatElBpM5zuczVh10huldtMnA:1610468609540&source=lnms&tbs=isch&sa=X&ved=2ahUKEwjGy5KL55buAhVSuXEKHUmpDAcQ_AUoAnoECBIQBA&biw=1778&bih=813#imgrc=1loZJGu7zVK6MAABAR)
- <https://www.google.com/url?sa=i&url=http%3A%2F%2Frathfarnhamcastle.ie%2Fthe-castle%2F&psig=AOvVaw1zBhEu9AIYmN2etluLa3tg&ust=1610555012064000&source=images&cd=vfe&ved=0CAIQjRxqFwoTCLigw67nlu4CFQAAAAAdAAA>

# Acknowledgments

- I obtained a lot of assistance from my Construction teacher Mr Murphy, when it came to obtaining materials and assisting in the gluing process due to its awkward positioning.



- When visiting the Rathfarnham Castle site, I gained a real insight into the proportionality of the castle itself and its design.



- When reading the guidebook sent to me by the Rathfarnham Castle Secretary, I was able to gain more information from the history aspect of the castle.

- My Construction teacher also assisted me by introducing new techniques of touching up my pieces for example using the shoulder plane to smooth out the cut section profile.



Isometric Render

# Photorealism



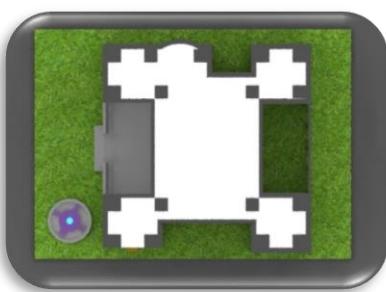
Front Elevation



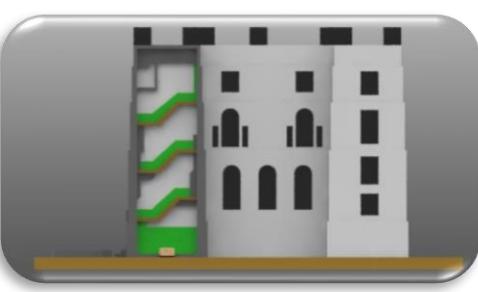
Back Elevation



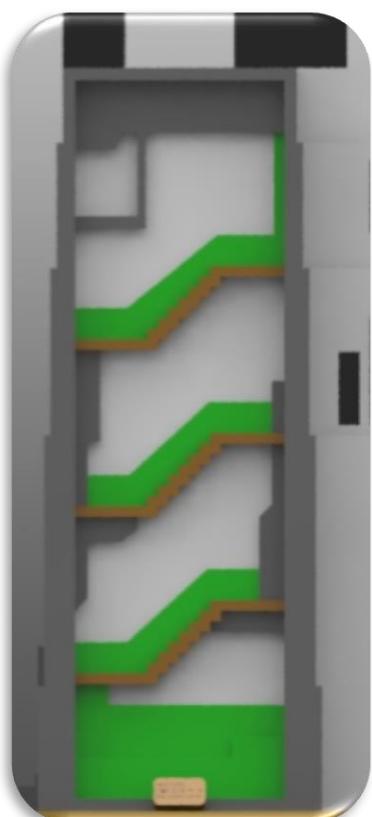
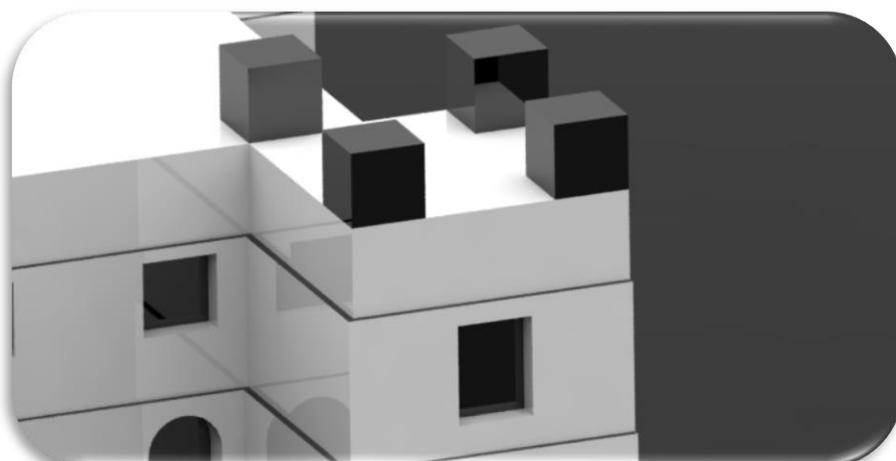
Left End View



Plan

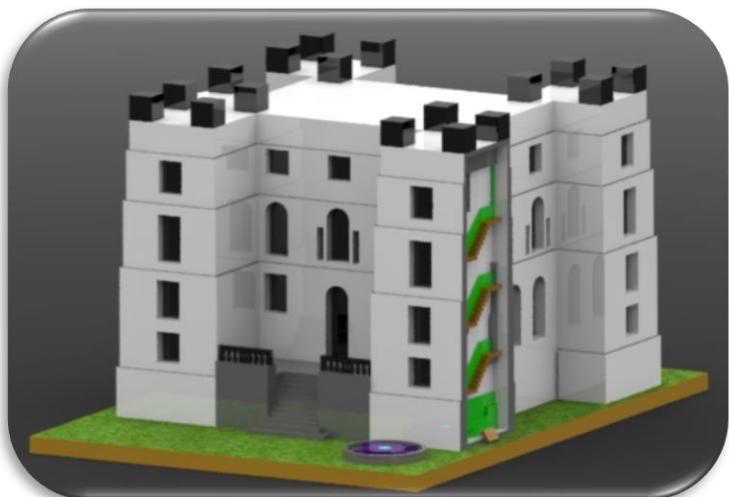
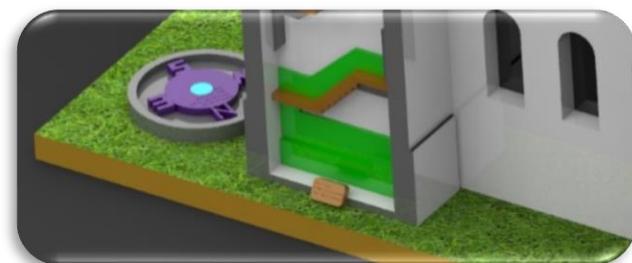
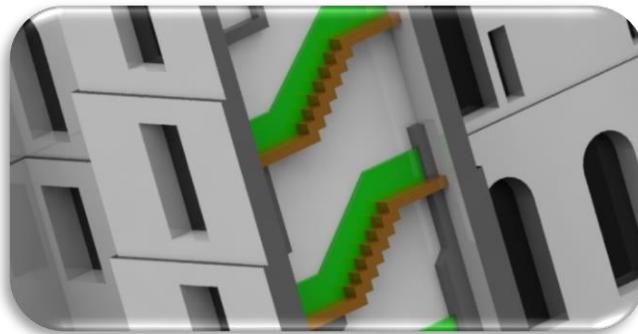
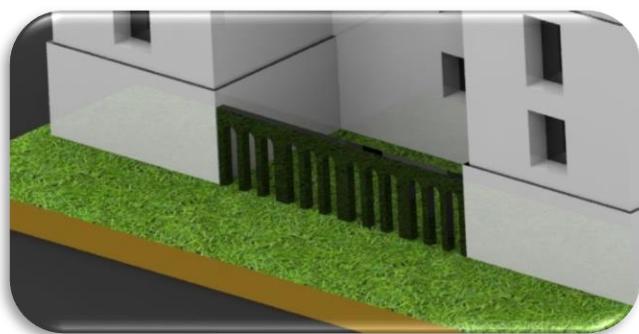
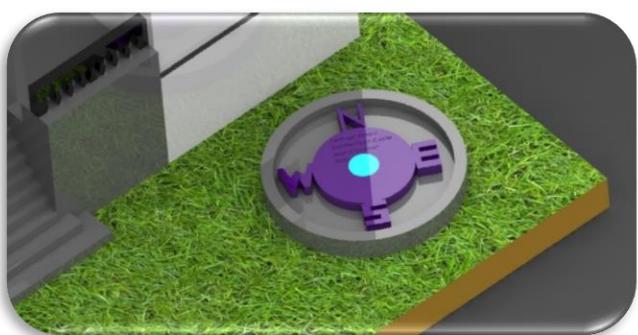


Right End View

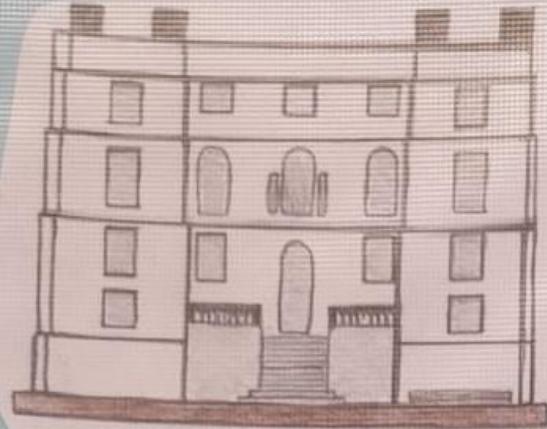


Cut Section View

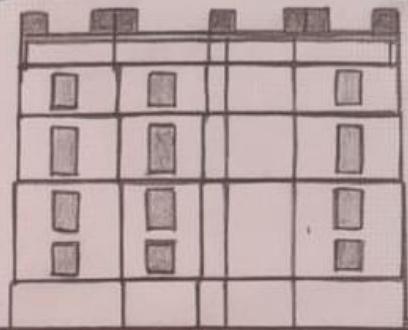




*sketches*



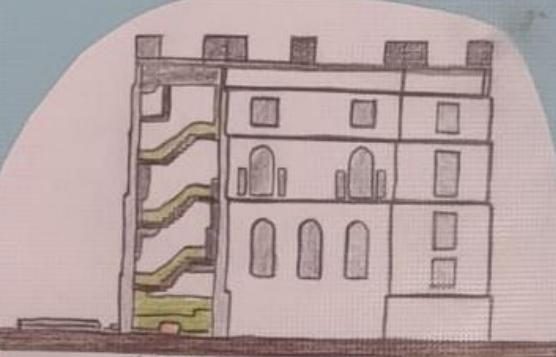
FRONT ELEVATION



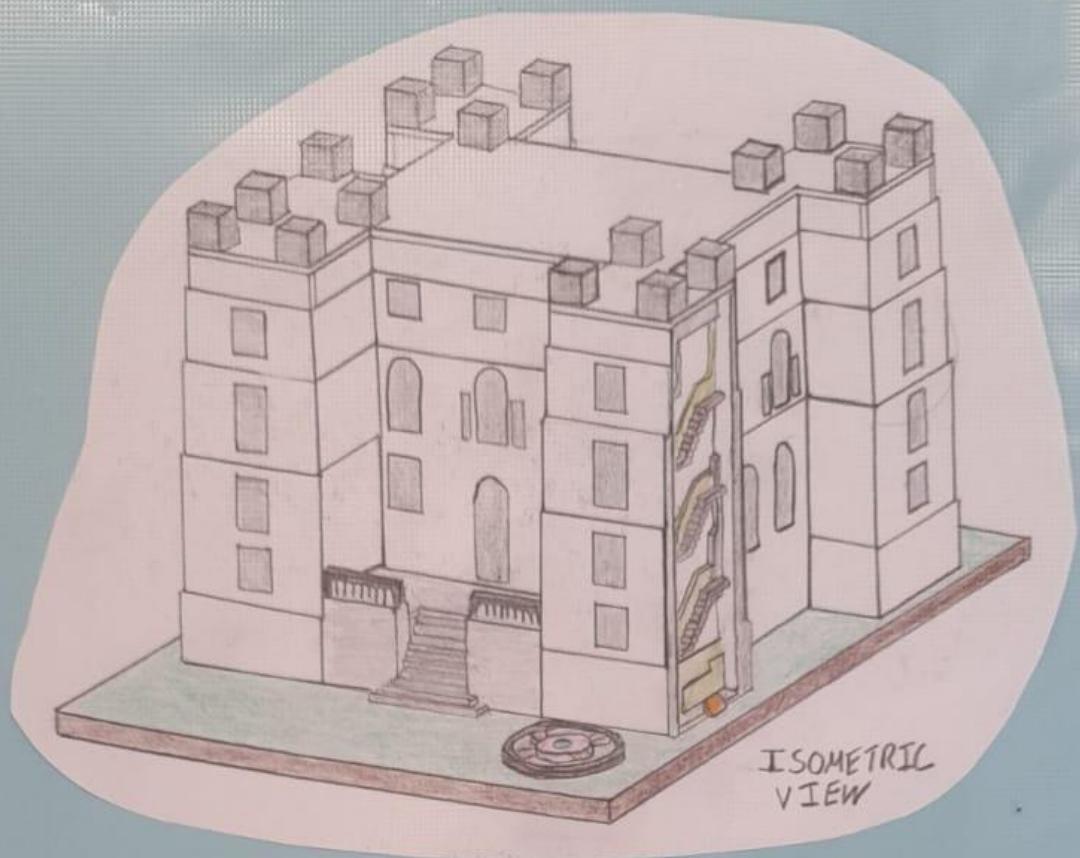
LEFT END VIEW

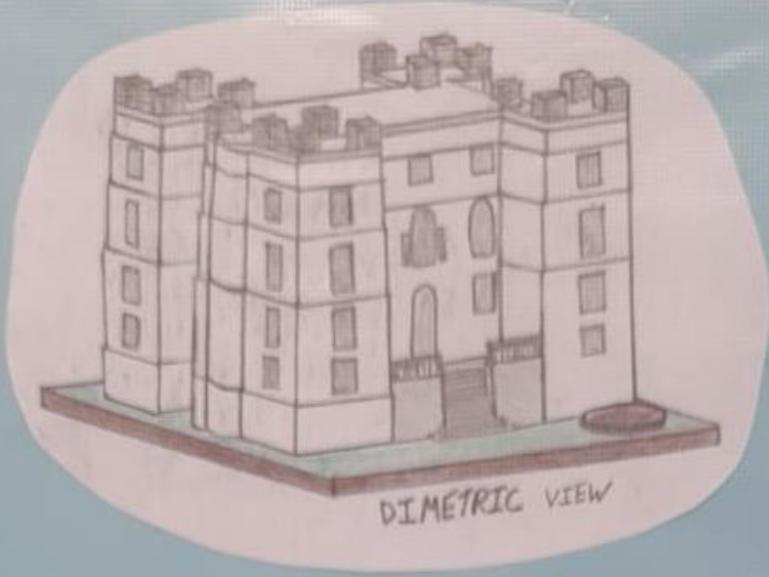


BACK ELEVATION

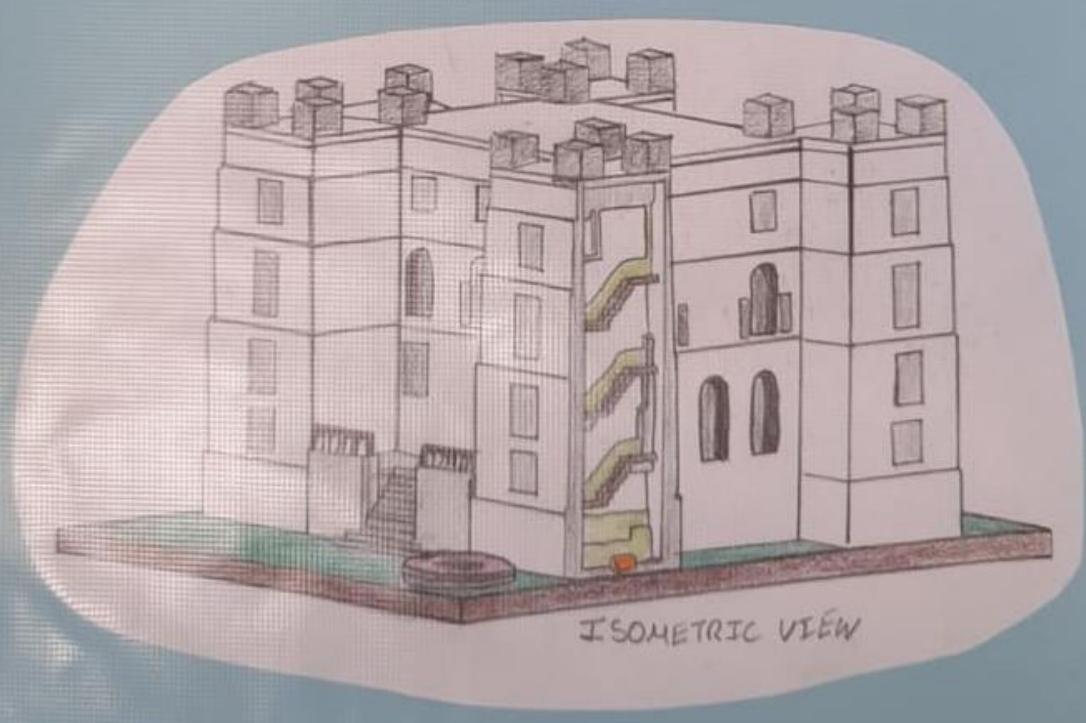


RIGHT END VIEW

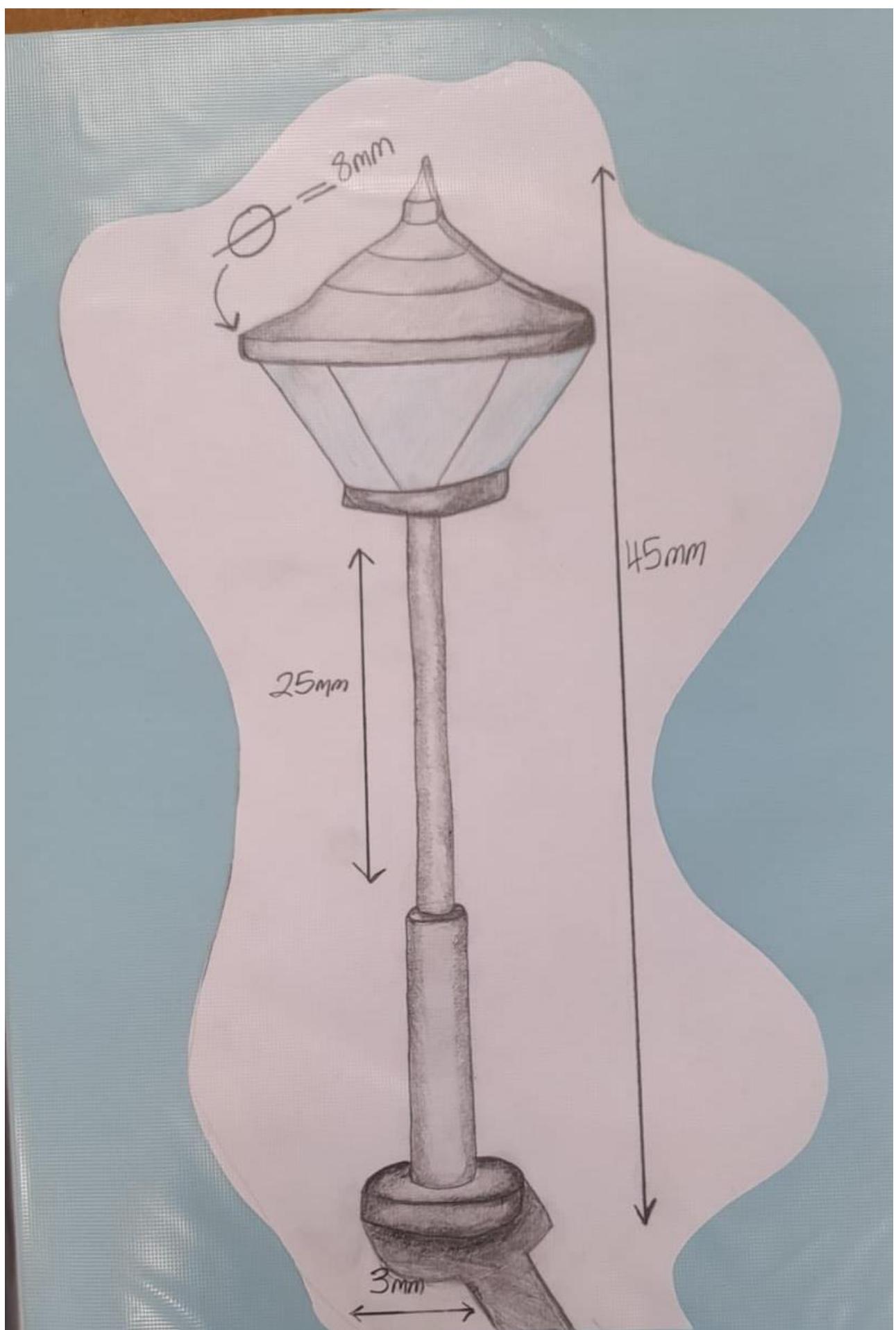


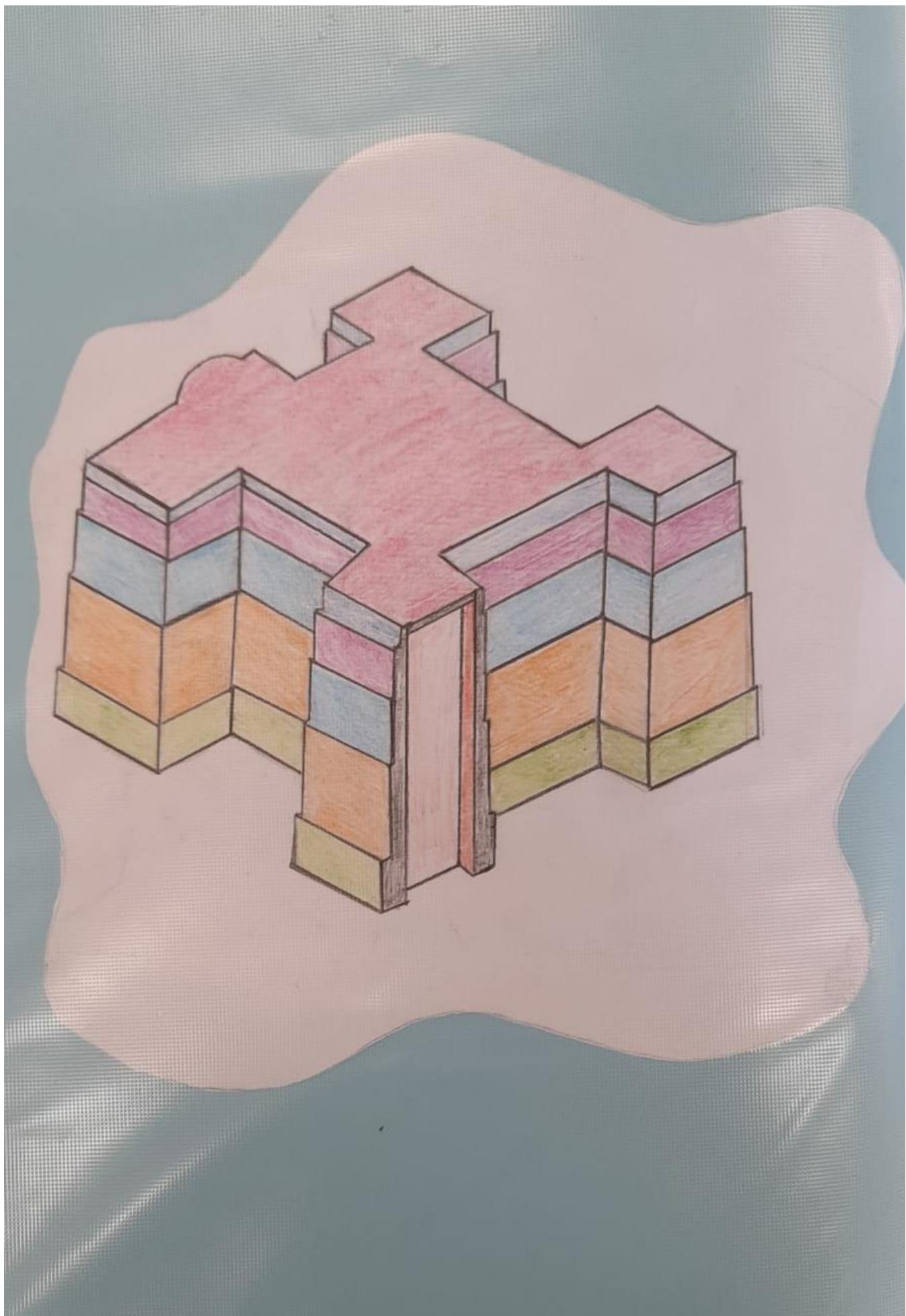


DIMETRIC VIEW



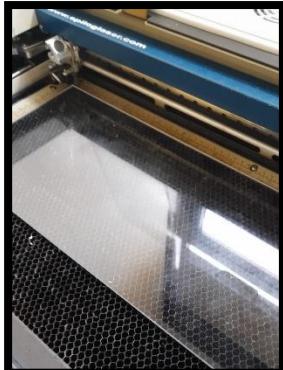
ISOMETRIC VIEW





# **Book Stand**

When doing my primary research, I obtained a book on Rathfarnham Castle's history. I then constructed a small stand to rest the book on. This was made from Acrylic using the strip heater. The edges were finished using black sandpaper, and I engraved the castle using the Epilog Engraver.



**Finishing Material**

**Engraving**

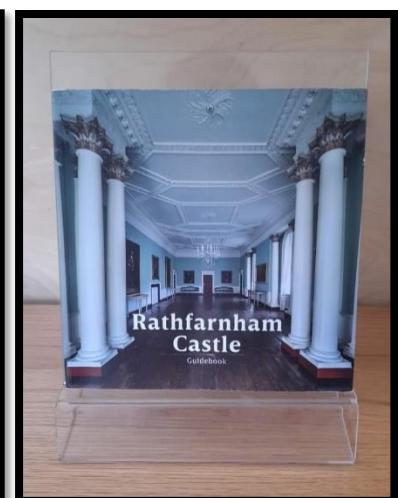
I made the stand twice, the first time I used Perspex, but it did not have the desired malleable properties of Acrylic. So, I remade the stand, using the red guide markers to keep the bends straight and ensuring my fingers were a safe distance from the heated wire.



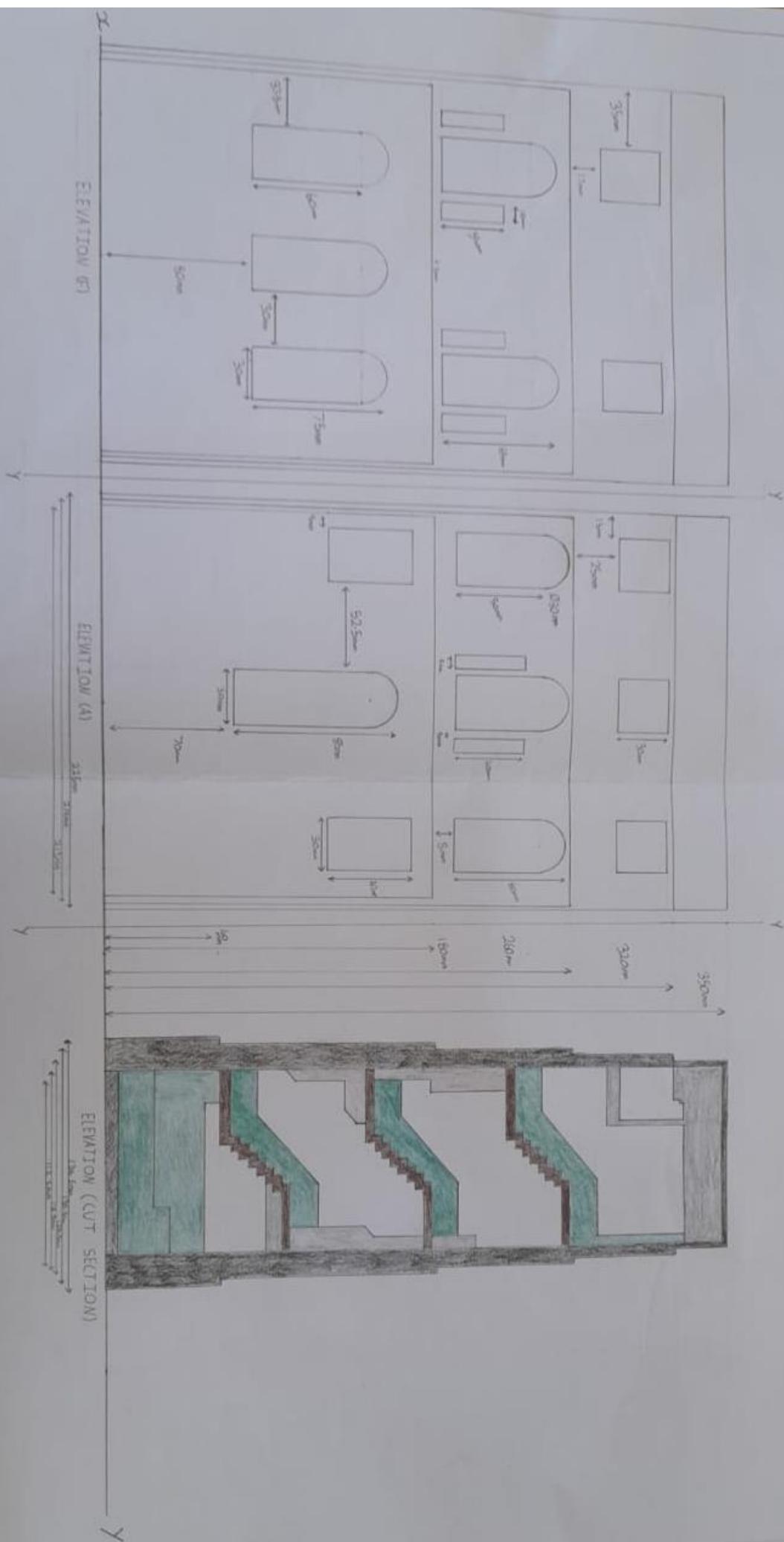
**Strip Heater**



**Manufacture Process**



# Orthagraphic Views



# Full Scale Plan

