CHICKADEE'S LANDING

Mira Abdalla & Arpit Malhotra | Fall '24 | Arch537

Black-capped chickadee bird. (https://www.migrationresearch.org/mbo/bcch_10102010.html)


Black-capped chickadee flying. (Alinka - http://www.redbubble.com/)people/alinka)


Image of model pieces.

BLACK-CAPPED CHICKADEE

Our nest box is designed for the black-capped chickadee and its radial panel design was inspired by the form of this bird's wings when taking flight.

The black-capped chickadee prefers nesting in tree trunks, so the rounded form of our nest box provides this familiarity.

This chickadee is fairly small. According to the Cornell Ornithology Lab, the ideal nestbox size for this bird is 4x4x8 inches and the ideal hole size is around 1" diameter.
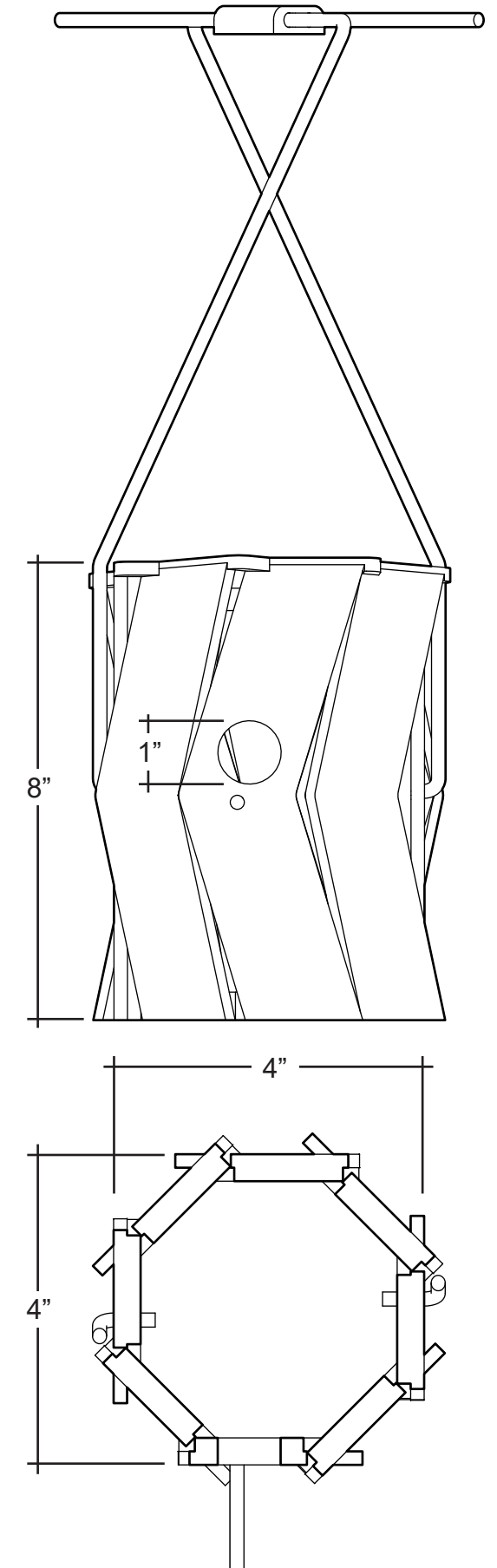
Nestbox plan and front elevation.

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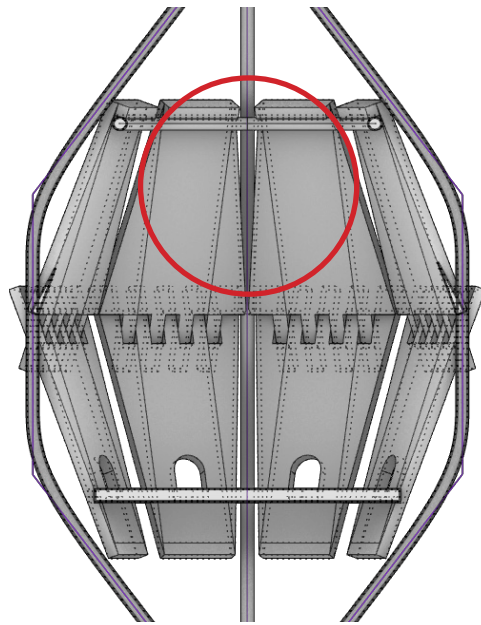
First iteration digital model.

DESIGN PROCESS

Our initial design had a radial form and multiple angles to navigate, which left us with many large gaps. This challenge inspired our design moving forward. The "arrow" like form emerged from our attempts to resolve this gap between angled elements while still maintaining the radial form.


Wall panel explorations, foam and wood.

JOINING DETAILS

Much thought was put into the way the wall panels would meet one another and be held together firmly. Our initial concept was for the rods to hold these elements in place. However, due to material constraints, we pushed ourselves to create a strong joint using CNC detailing.

In our final assembly, the roof and ground are critical components in the structure. The roof "locks down" onto the wall pieces to secure the assembly, inspired by our early CNC workshop joints.
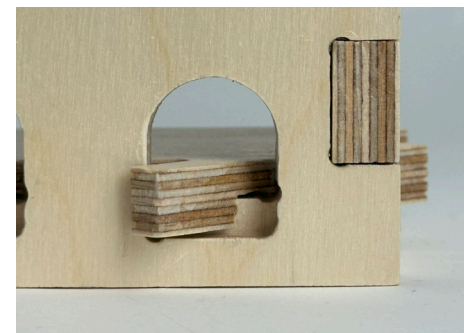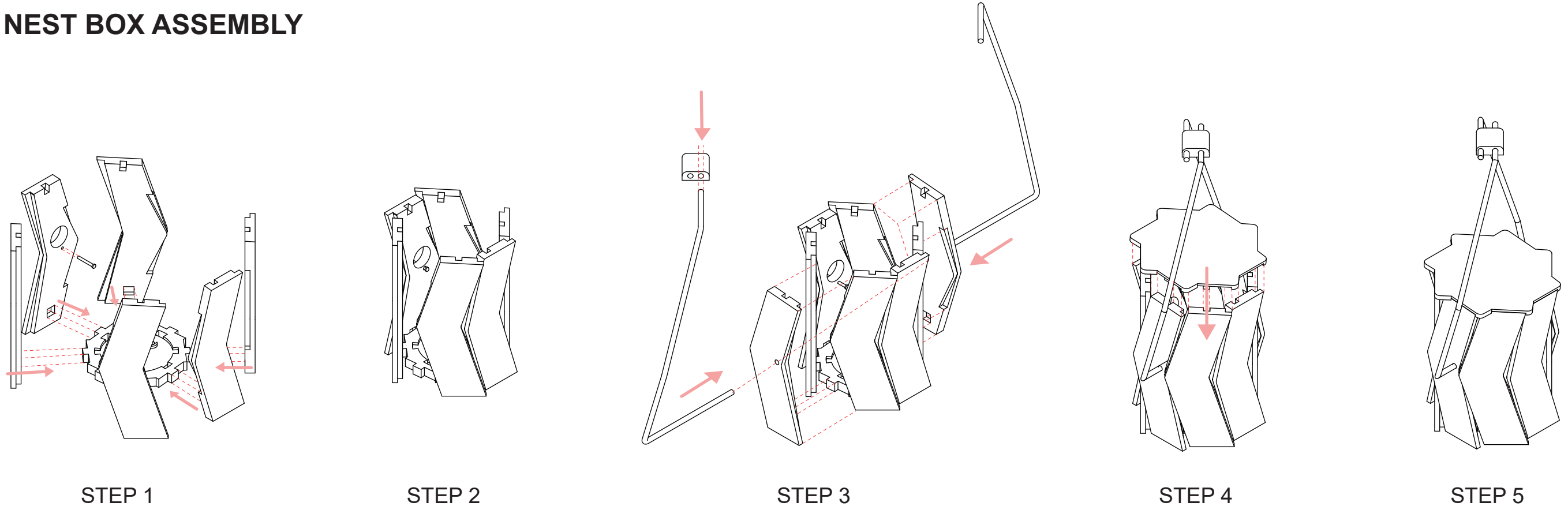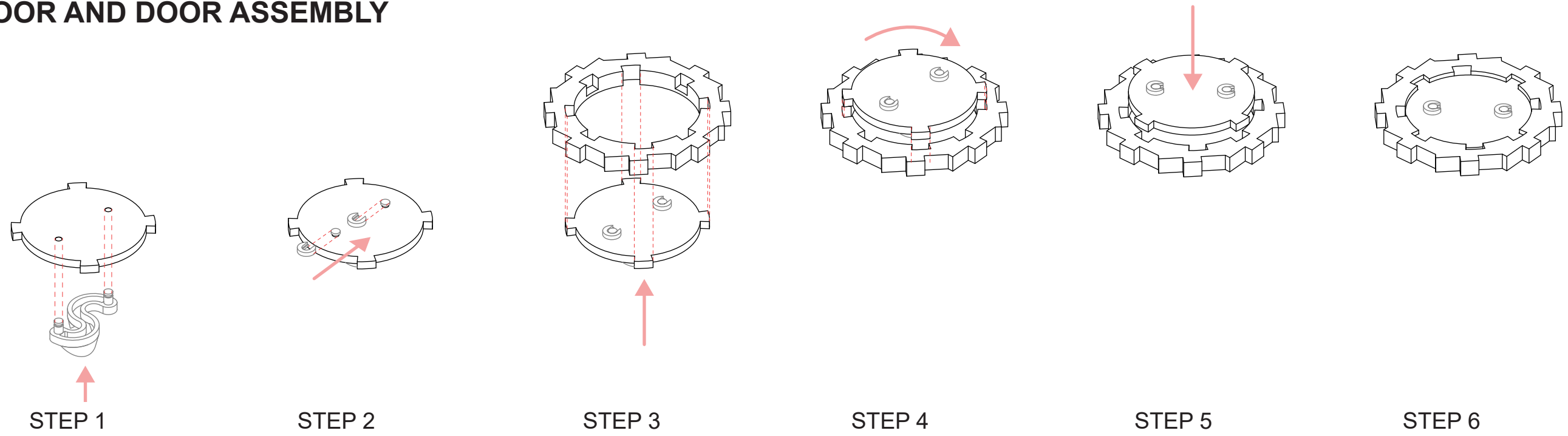

Locking joint from CNC workshop.

Foam core process model.

NEST BOX ASSEMBLY

STEP 1   STEP 2   STEP 3   STEP 4   STEP 5

FLOOR AND DOOR ASSEMBLY

STEP 1   STEP 2   STEP 3   STEP 4   STEP 5   STEP 6
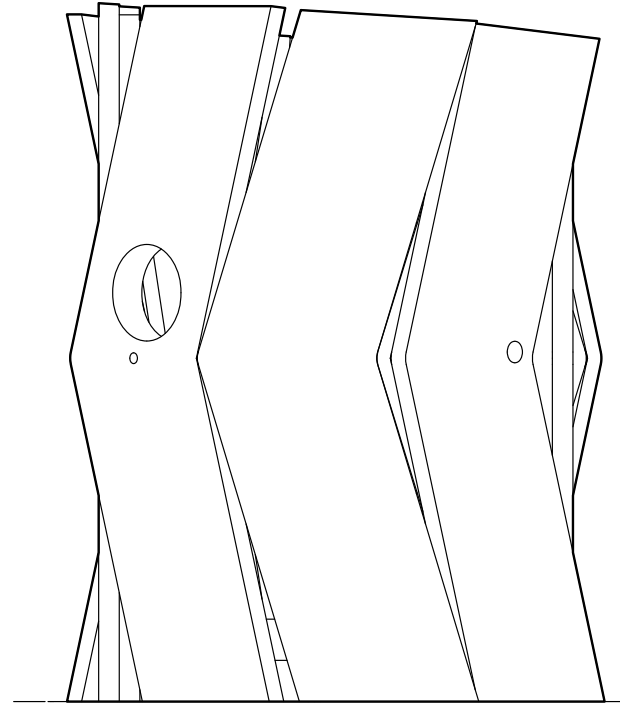
WALL PANELS
CNC Plywood .048"

This assembly consists of eight wall panels which attach in a radial manner to create the rotational form of the nest box.

The top of the nestbox is sloped for drainage and aesthetics. This was accomplished by sloping the tops of each panel and gradually decreasing the height from the front of the nest box to the back.
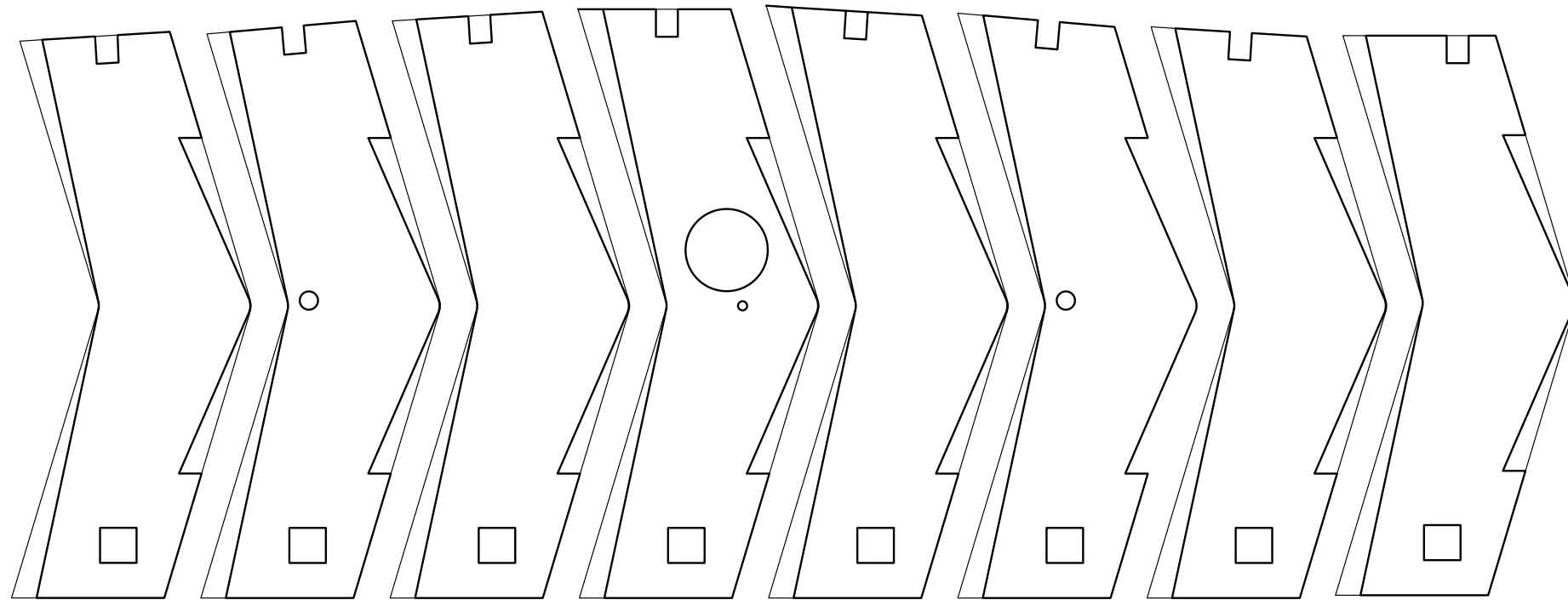
The illustration at the far right of this page shows some of the details that were needed to achieve this design, including tolerances and pocketing.
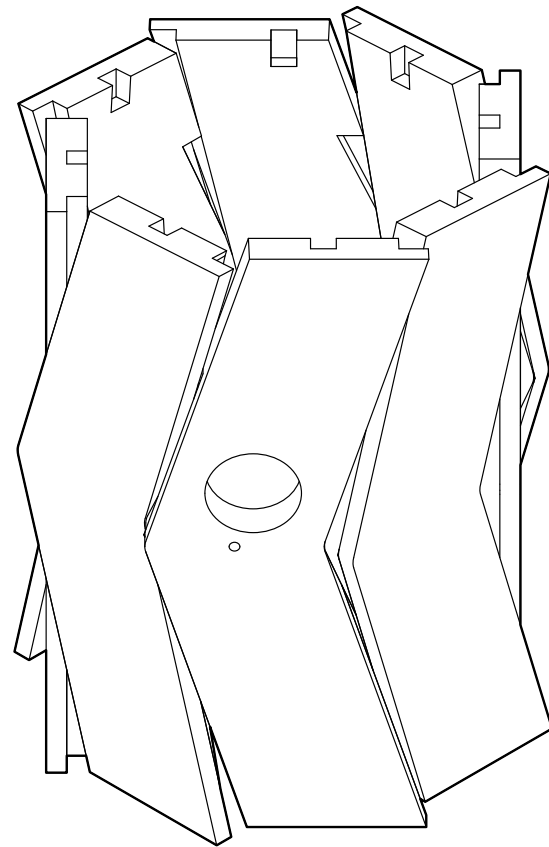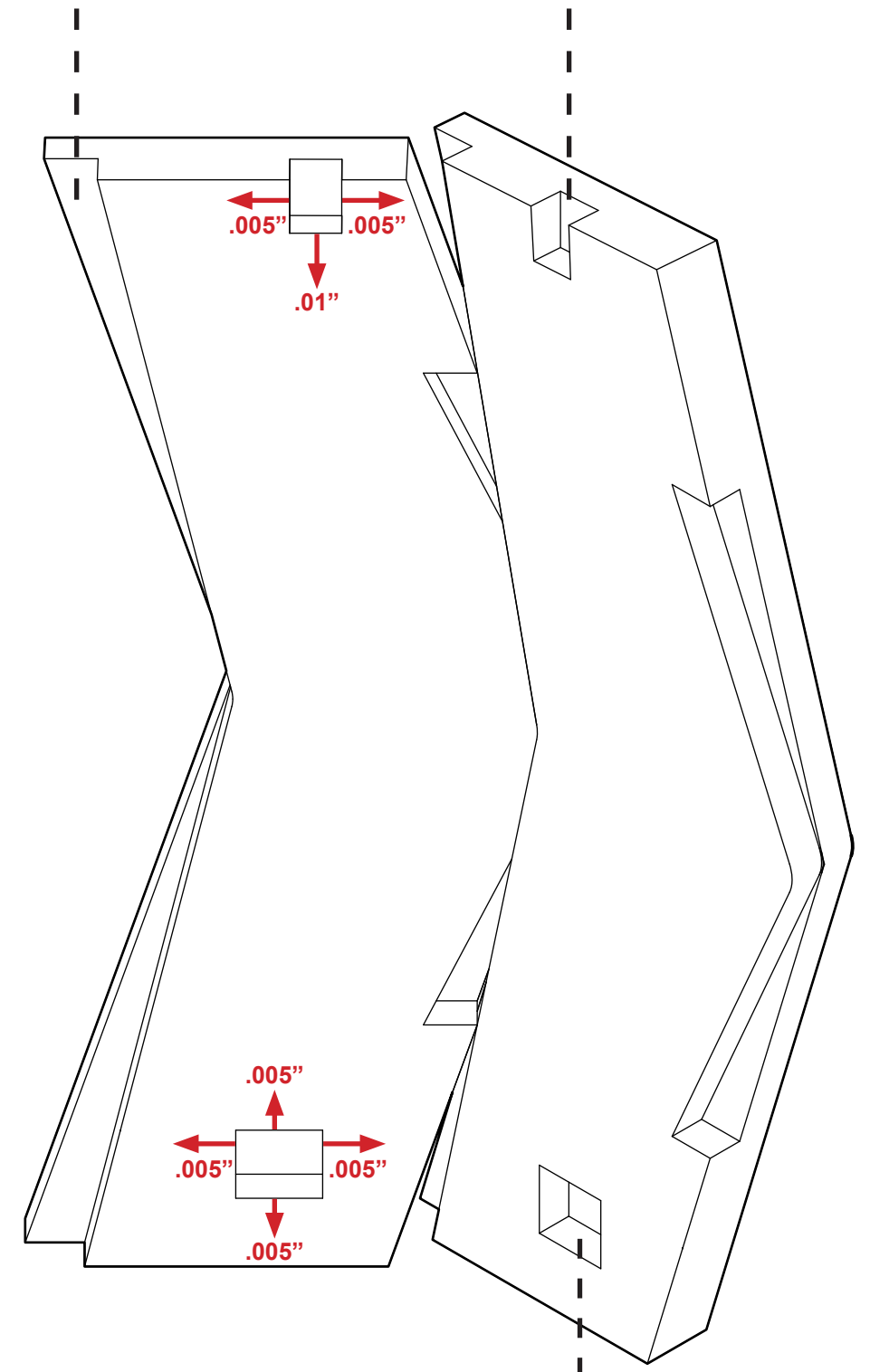

Isonometric of walls assembled.

Right elevation, showing slanted top.

Layout of all wall panels in the assembly.

Edges 1/4" pocketed for panels to meet at an angle.
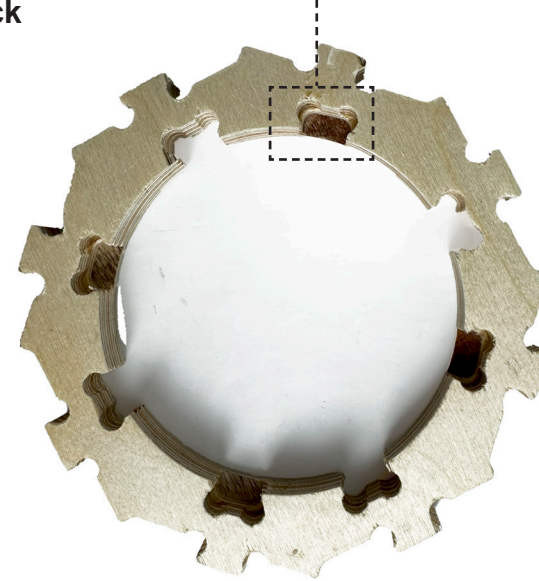
1/4" pocketed panels for ceiling to lock into.

.005"   .005"

.01"

.005"

.005"   .005"

.005"

1/4" Pocketed panels for floor.
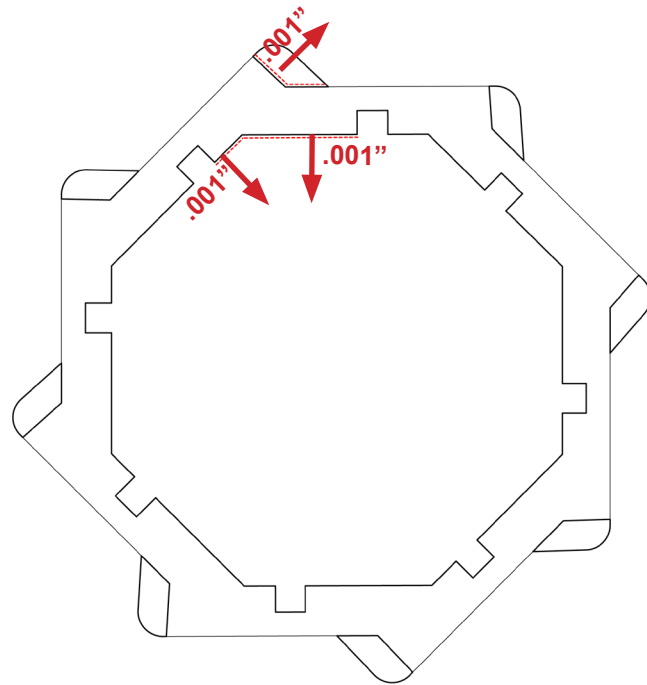

Diagram of CNC features and tolerances.
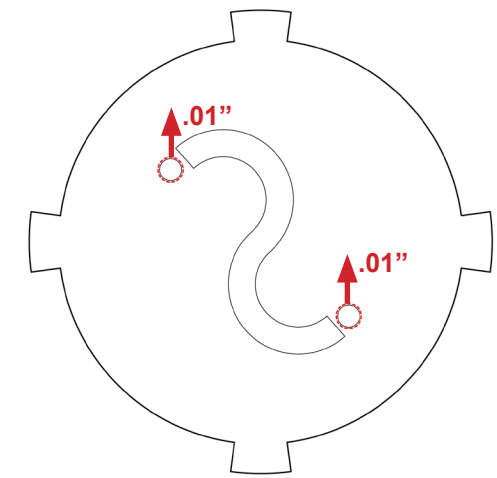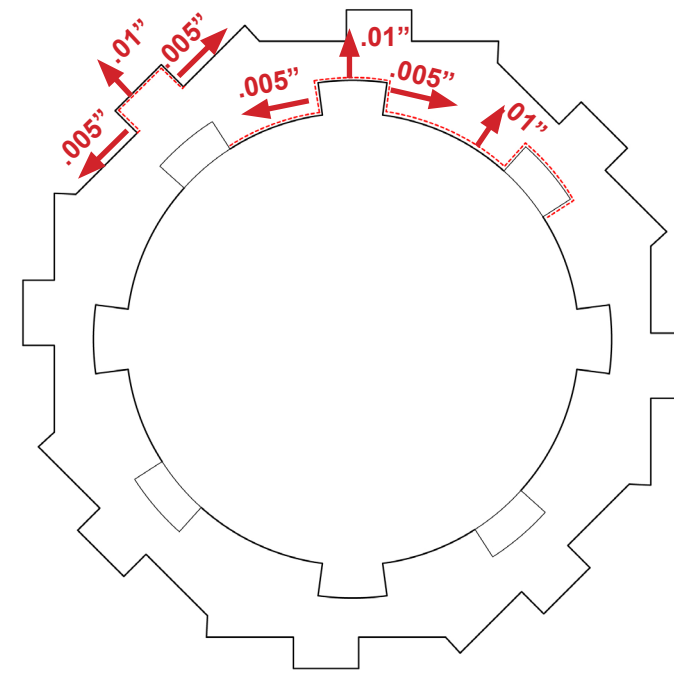
CNC CEILING

The ceiling is pocketed to securely lock into the walls. As the wall heights vary in a hierarchical manner, the ceiling slopes, allowing rainwater to drain off effectively. The corners are rounded to soften the form and angles, creating a more fluid and seamless design.
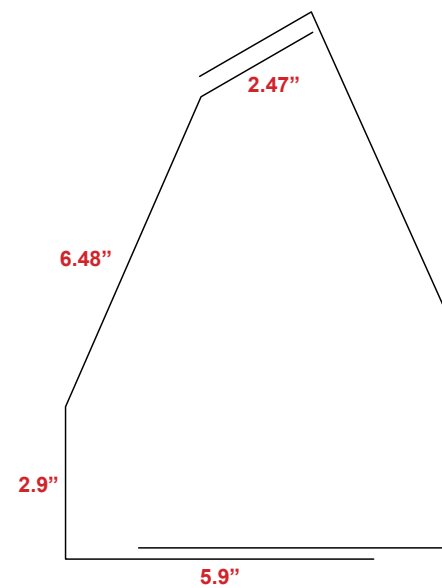
CNC FLOOR AND DOOR

The floor is pocketed to allow the door to be pushed in from below, rotate, and slide back into the slot, providing a secure locking system while making it easier for the user to open and clean the nest. Additionally, joinery details are incorporated to lock the walls to the floor in a radial pattern, ensuring a stable and durable structure.

The CNC door is externally pocketed to accommodate an S-shaped knob. It features two drilled holes that allow the 3D-printed knob to securely lock in place.
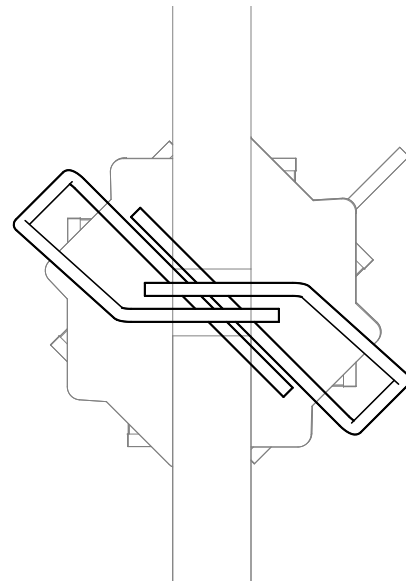
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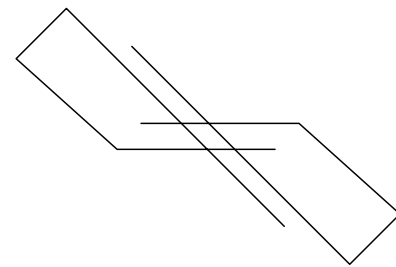
Plan view of submitted linework.

Plan view of rods.

ROD CONNECTOR

.005"
.005"

DOOR KNOB

.01"
.01"
.01"
.01"
.01"
.01"
.01"
.01"
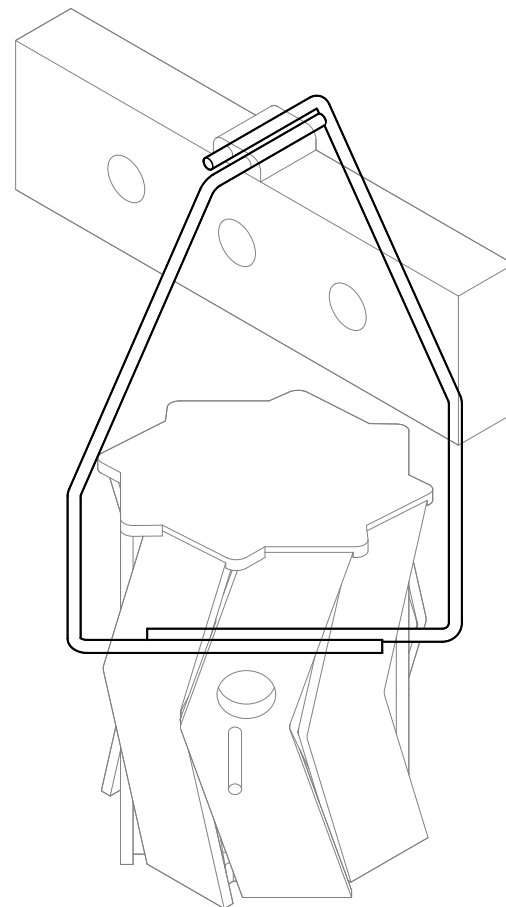

2.47"
6.48"
2.9"
5.9"

Plan view of submitted linework.

Isometric view of rods.

ROD BENDING

The rod elements are two identical pieces rotated 180 degrees to provide balance for the nestbox and oppose wind forces. Rod angles follow the angles of the nest box to provide a continuation of the design.
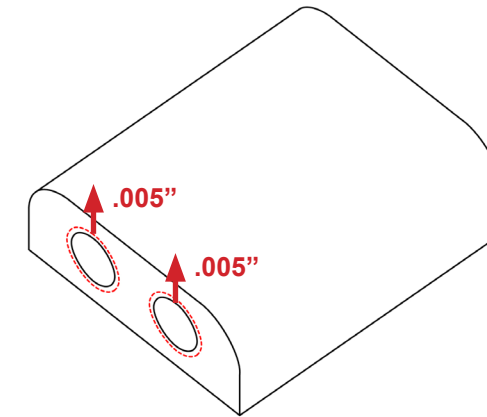
3D PRINTING

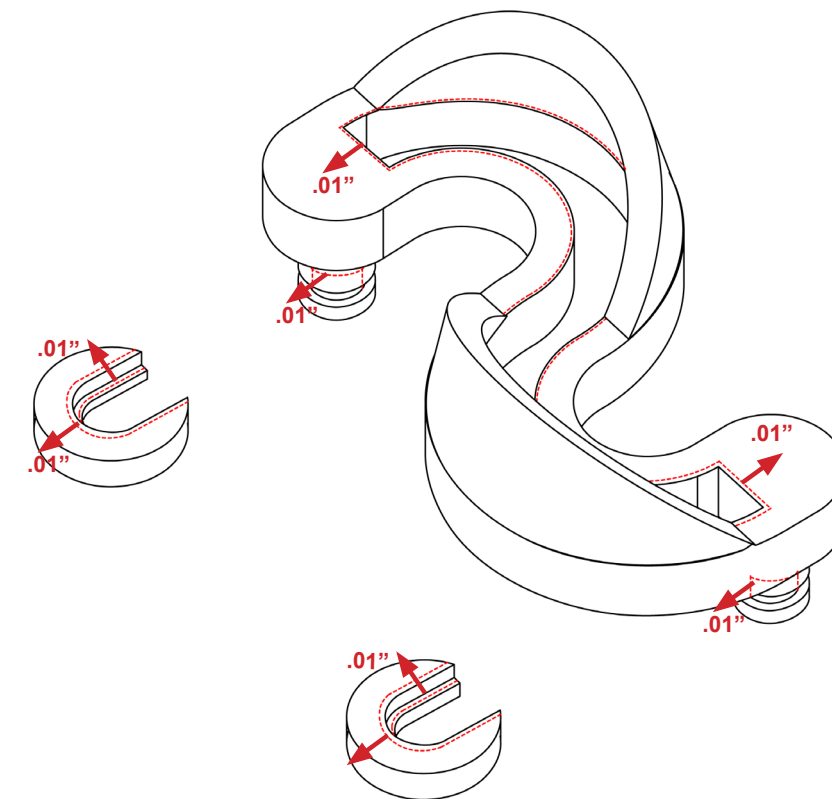Rod connector 3d print connects the two rods holding the nest box hanging below. upper surface is made curved to create a softer edge. Door knob takes the shape of an 's' as per the cnc door, and a curved semi-dome provides a better grip for the user to operate the door. Two bait pieces keep the knob locked with the door using gravity.
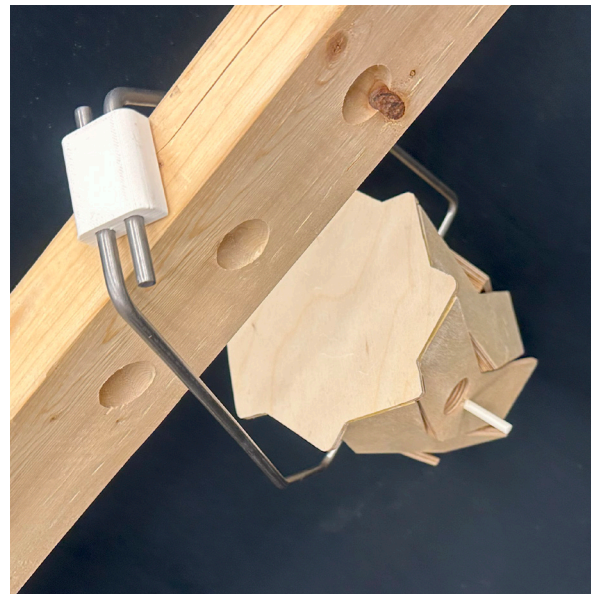
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FLOOR AND DOOR ASSEMBLY

start

align

push

twist

pull

A collection of detail images of the nestbox.

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Thanks for flying by!