



# ***PALMER'S DOLLHOUSE***

## **CONSTRUCTION PLANS AND BASIC ASSEMBLY INSTRUCTIONS**



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**Dollhouse Technical Drawing and Instructions by Matt Palmer**

Questions regarding the interpretation of these directions or general construction of this dollhouse may be directed to Captain Matt Palmer at: [mpalmer351@me.com](mailto:mpalmer351@me.com) or on  Twitter [@MattP351](https://twitter.com/MattP351). All other questions regarding the presentation and use of this dollhouse for training purposes should be directed to Deputy Chief P.J. Norwood or Lieutenant Sean Gray at: [stopbelievingstartknowing@gmail.com](mailto:stopbelievingstartknowing@gmail.com) or on  Facebook at: <https://www.facebook.com/StopBelievingStartKnowing/info>



Hello and again thank you for requesting the plans for the doll house small scale live fire behavior prop.

We are more than willing to you share with you. However we ask for something in return.

In return we only ask for a few things!

1. Share it with others
2. Give the credit to the right people. Don't steal ideas, borrow them, expand, share, and give appropriate credit where credit is due
3. Go to and like the Stop Believing and Start Knowing (SBSK) Facebook, Instagram, and Twitter pages
4. Share your success and photos using this prop on the SBSK pages

As you saw in the video and will see when training, door control and controlling the openings are a necessity. We have included a few articles below that you may want to read and share. When using the prop there will be many factors that you will need to practice, learn and overcome that will enhance or turn your drill into a disaster. Wind, temperature, humidity, etc. will all play a role in how the prop behaves. Its important to build it as listed. Many have asked if lining with sheetrock would be beneficial to take the prop from a single use prop to a multiple use prop. Sheetrock will not work as the box itself becomes part of the fuel load. You need to use OSB to heat up and off-gas to provide an environment that creates the needed fire behavior. The sheet rock will not allow that. However, please feel free to make this prop even better and then share your results with us.

PLEASE also do not take for granted the necessity to wear an SCBA when operating the box. The OSB gives off toxic smoke! We have experienced first hand the negative impact of the smoke from this prop. Do not take it lightly and wear your air at all times during this training

event. We have a DVD titled The Evolving Fireground- Research Based Tactics, that explains it in detail and will be followed by a book. If you're interested go to:

<http://www.pennwellbooks.com/shop-fire-books-videos/the-evolving-fireground-research-based-tactics/>

We would also urge you to consider Tempest PathMaster smoke control devices. It's a great device to control the openings and keep your firefighters safe. <http://www.tempest.us.com/other/pathmaster.cfm>

Fire Engineering Training Minutes video - <http://www.fireengineering.com/articles/2016/07/firefighter-training-video-fire-behavior.html>

Check out this article on a live fire that we evaluated the PathMaster on in CT. Evaluation of flow path control — <http://www.fireengineering.com/articles/2014/12/draft-curtain-tactics.html>

Keep it rich — vent limited fires <http://www.fireengineering.com/articles/2014/01/ventilation-limited-fire-keeping-it-rich-and-other-tactics-based-off-science.html>

Controlling the openings — <http://www.fireengineering.com/articles/print/volume-167/issue-10/features/controlling-the-openings-is-this-the-future-of-ventilation.html>

Flow Path Control - <http://community.fireengineering.com/m/blogpost?id=1219672%3ABlogPost%3A596619>

Searching in the flow path — <http://www.fireengineering.com/articles/print/volume-168/issue-6/features/searching-in-the-flow-path.html>

Lastly, remember the prop and live fire demo is only one piece of the puzzle. Firefighters and officers must have a better understanding of fire

behavior and fire dynamics. Training should start in the classroom and then move to the live fire demo. Any questions please let us know. We are more than willing to travel to your department to deliver training programs.

Sincerely,

P.J. Norwood and Sean Gray

[stopbelievingstartknowing@gmail.com](mailto:stopbelievingstartknowing@gmail.com)



## Dollhouse Fire Behavior Demonstration

Sean Gray and P.J. Norwood

### Lesson Plan

1. Materials Needed
  - a. Four Compartment Box (see step by step directions to build)
  - b. Straw or hay
  - c. Small thin pieces of wood (pine door shims work well)
  - d. Propane torch
  - e. Water spray bottle
  - f. Extinguishment – garden hose or three 2.5 gallon pressurized water extinguishers
  - g. Six to ten Styrofoam cups
  - h. Table or similar item to place box on that raises the box 4-5' off the ground (6 pallets works well)
  - i. Two firefighters with self contained breathing apparatus
2. Set up
  - a. Place box on table or platform
  - b. Place all other equipment near box
  - c. Turn water on and fill spray bottle
  - d. Build a small fuel package out of the straw and wood strips in the lower left compartment (compartment #2)
3. Start training session
  - a. Start with all compartments closed and isolated from each other and the two roof slide doors closed
  - b. Using torch light the straw and wood strips on fire
    - i. Discussion points
      1. Smoke color, velocity, density and pressure
    - ii. Once the fire is light you need to control the opening of the compartment and allow the fire to grow slowly. You can open and shut the compartment demonstrating how you can choke the fire out with simply eliminating the air.
    - iii. Once the compartment it self starts to burn (not just the added fuel) you want to shut down the compartment 90%. This will allow for demonstration of the smoke “puffing” and “breathing” at the opening. Open and close the compartment at different percentages and discuss the differences in the smoke and volume of fire based on the amount of oxygen available



- c. Utilizing the torch attempt to light off smoke outside of the box. At this point the smoke should not light off or even sustain combustion
  - i. Discussion points
    - 1. Smoke is fuel
- ci. Place Styrofoam cups into the compartment
  - i. Discussion points
    - 1. Smoke color, velocity, density and pressure

*\*NOTE* – from this point you will want to open and close each compartment at different percentages and times. At times just one compartment isolated from the others. At times multiple compartments not isolated. Try the closures at different times and different percentages. The more you play with controlling the openings the more fire behavior you will generate. It takes time and practice to manage the box. Burning the box is easy. Managing the box to create vent point ignition, ventilation induced back drafts, neutral plane, unidirectional and bidirectional flow are the challenging pieces. During the demonstration you need to utilize the spray bottle to extinguish any fire burning around the lower left compartment and any fire on the exterior of the box. It's also a good idea to apply water to the exterior of the box in the back and side of the lower left compartment (compartment #2). Have patience and practice!

- e. Take off door to the lower right compartment (compartment #3)
  - i. Discussion points
    - 1. Smoke color, velocity, density and pressure
- f. Open up door that separates lower left (compartment #2 and lower right compartment (compartment #3)
  - i. Discussion points
    - 1. Smoke color, velocity, density and pressure
- g. This compartment you will want to open and close at different percentages and intervals. Close off lower left (compartment #2) completely
  - i. Discussion points
    - 1. Smoke color, velocity, density and pressure
    - 2. Identification of neutral plane
- h. Close the bottom right (compartment #3) completely and slightly open the lower left (compartment #2)
- i. Utilizing the torch attempt to light off smoke outside of the box. At this point the smoke should light off but will not sustain combustion
  - a. Discussion points
    - i. Smoke is fuel
- j. Open up the front of upper right (compartment #4)
  - i. Discussion points
    - 1. Smoke color, velocity, density and pressure
    - 2. Neutral plane



- k. Open up door in the floor of top right (compartment #4) and bottom right (compartment #3)
  - i. Discussion points
    - 1. Smoke volume, velocity, density, and color
    - 2. Identification of neutral plane
  - l. Open up the peaked roof door and remove the gable end vent covers
    - i. Discussion points
      - 1. Smoke volume, velocity, density, and color
- m. Open up the ceiling in attic space
  - i. Discussion points
    - 1. Identification of neutral plane
    - 2. Ventilation doesn't equal cooling
    - 3. Vent point ignition
- n. Now work backwards – close the roof and then each compartment. This will increase pressure and heat within the box
  - i. Discussion points
    - 1. Smoke volume, velocity, density, and color
    - 2. Identification of neutral plane
    - 3. Ventilation doesn't equal cooling
    - 4. Vent point ignition
    - 5. Sizing up the openings
- o. Utilizing the torch attempt to light off smoke outside of the box. At this point the smoke should light and will sustain combustion
  - i. Discussion points
    - 1. Smoke is fuel

\*Note – during the demonstration the goal is to point out and discuss fire behavior and its relationship with fireground tactics. All too often we teach fire behavior and tactics as separate lessons. During this separation we do not educate firefighters on the relationships between fire behavior and our tactics. Our tactics have both a positive and negative impact on the fire behavior and it is up to us utilizing this small-scale fire behavior prop to outline both the positive and negative.

If you have any additional questions please contact Sean Gray and P.J. Norwood at [stopbelievingstartknowing@gmail.com](mailto:stopbelievingstartknowing@gmail.com)

Please post any photos and videos during your training on the *Stop Believing Start Knowing* Facebook page.





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# ***FIRE TRAINING DOLLHOUSE***

## **CONSTRUCTION PLANS AND BASIC ASSEMBLY INSTRUCTIONS**

### **Materials Needed:**

- 2 sheets of 4' x 8' 7/16" oriented strand board (OSB)
- 1" staples for use with a pneumatic staple gun
- Caulk or construction adhesive (to seal any gaps)

### **Time Required to Cut and Assemble:**

- Depending on your skill level and patience, you should allow 3 to 4 hours to complete this project.
- Although you will ultimately burn this doll house, the skill and accuracy used to assemble this house will ensure a tighter fit and seal between rooms and allow for greater results during the training exercise.

### **Tools Needed:**

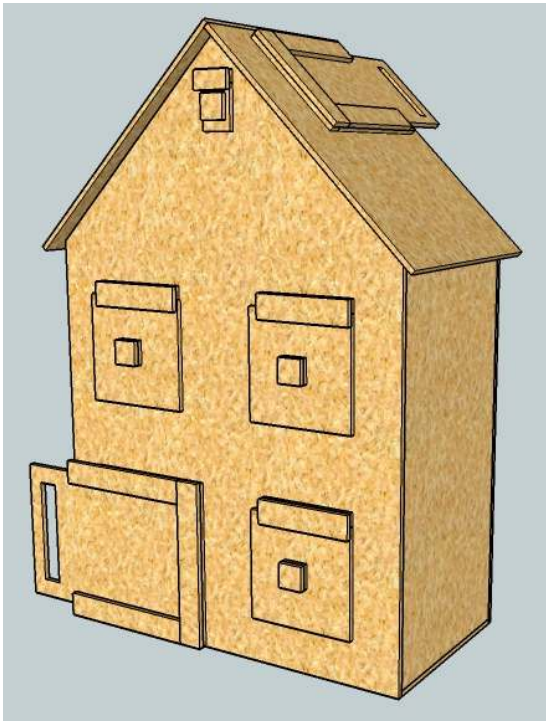
- Table saw or worm drive saw (to cut and rip OSB)
- Miter saw
- Jig saw or oscillating multi-tool style saw
- Pneumatic stapler with compressor
- Cordless drill with spade style wood drill bit
- Files or sand paper

### **WARNING**

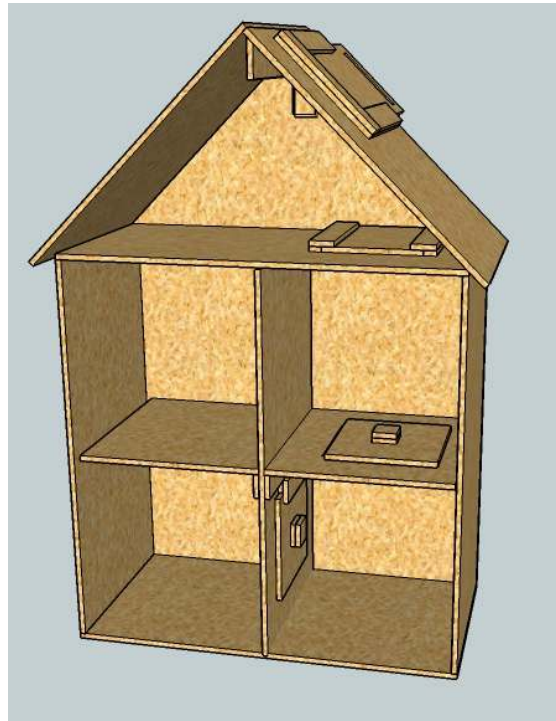
This drawing is for reference and construction purposes only and NOT designed to serve as a guide on how to conduct training sessions involving any live fire scenario. Any and all training associated with the use of the plans contained herein are done at the user's own risk.

# ***FIRE TRAINING DOLLHOUSE***

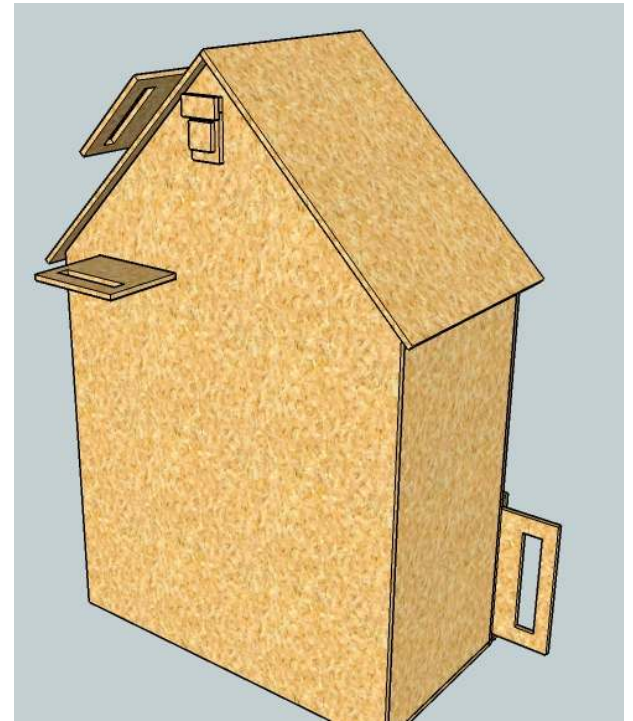
## **CONSTRUCTION PLANS AND BASIC ASSEMBLY INSTRUCTIONS**



Front View



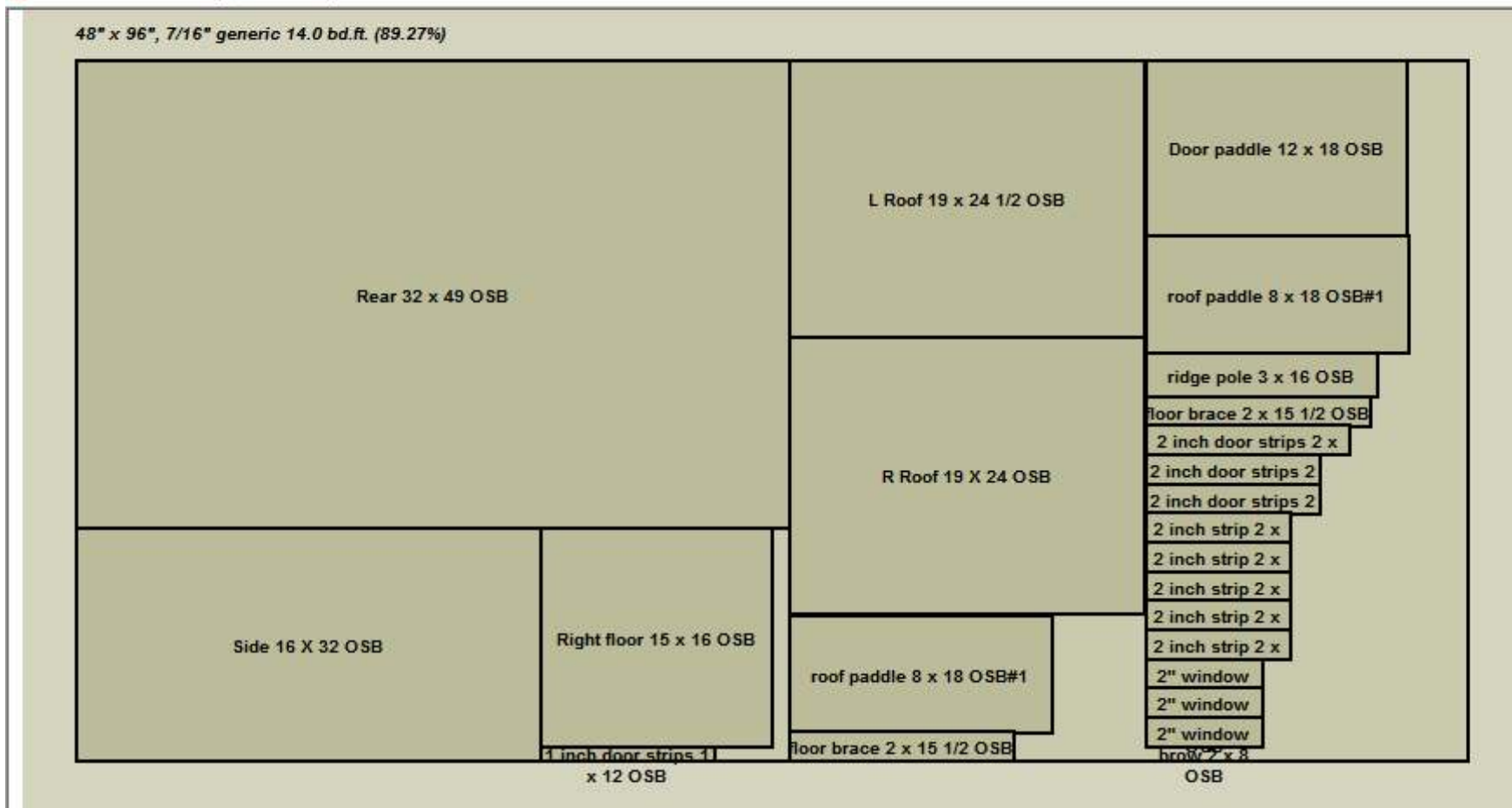
Interior View



Rear View

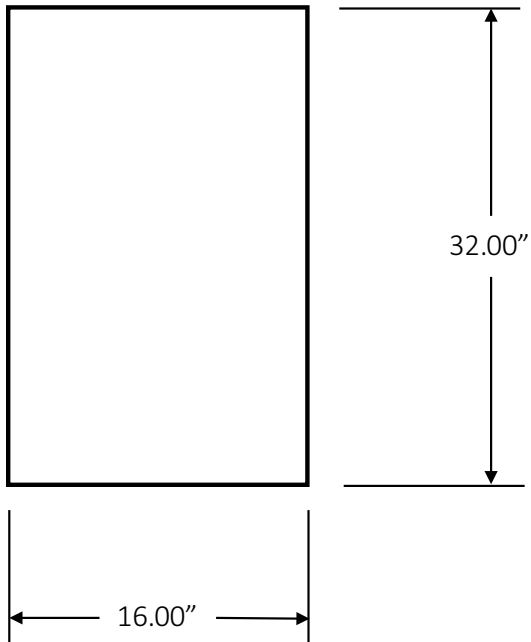


## CUTTING DIAGRAM – SHEETS OF 7/16” OSB

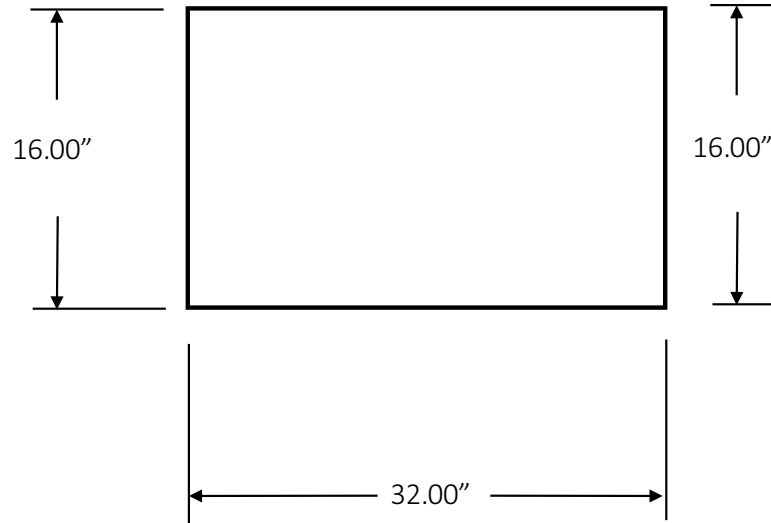


## STEP 1 – CUTTING PANELS TO SIZE

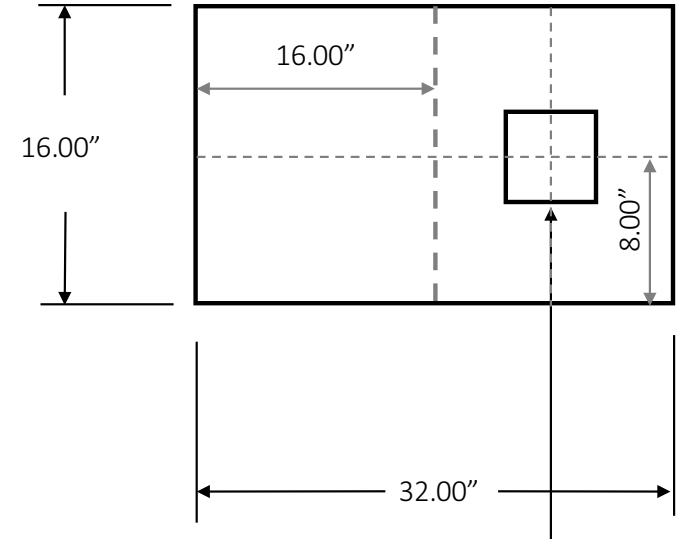
### SIDE PANEL (NEED 2)



### BASE PANEL



### CEILING PANEL

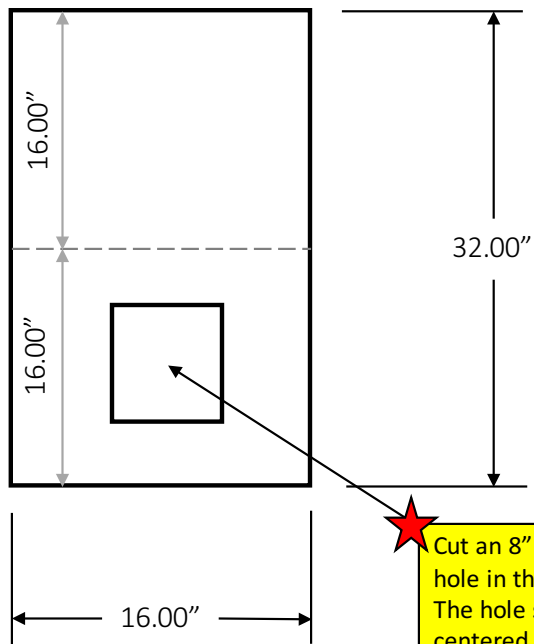


Cut a 6" x 6" square vent hole in the ceiling panel only. The hole should be centered on the right side of the mid-line as shown.

**NOTE: NOT TO SCALE**

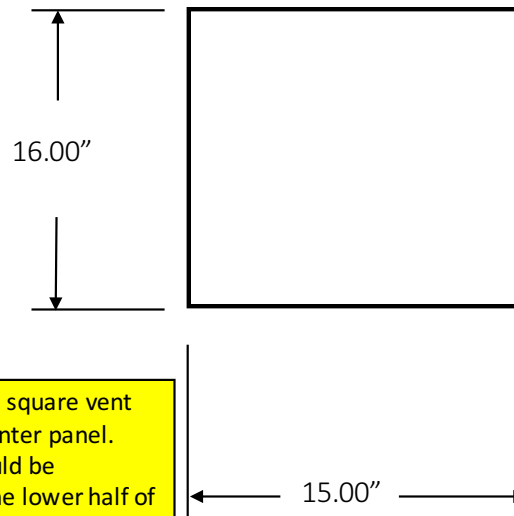
## STEP 1 – CUTTING PANELS TO SIZE

### CENTER PANEL

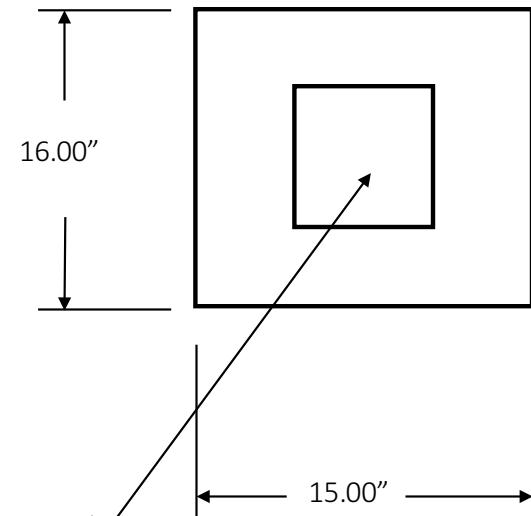


Cut an 8" x 8" square vent hole in the center panel. The hole should be centered in the lower half of the center panel. *THIS IS A CRITICAL STEP. DO NOT FORGET TO CUT THE 8" x 8" SQUARE OUT.*

### LEFT FLOOR PANEL



### RIGHT FLOOR PANEL

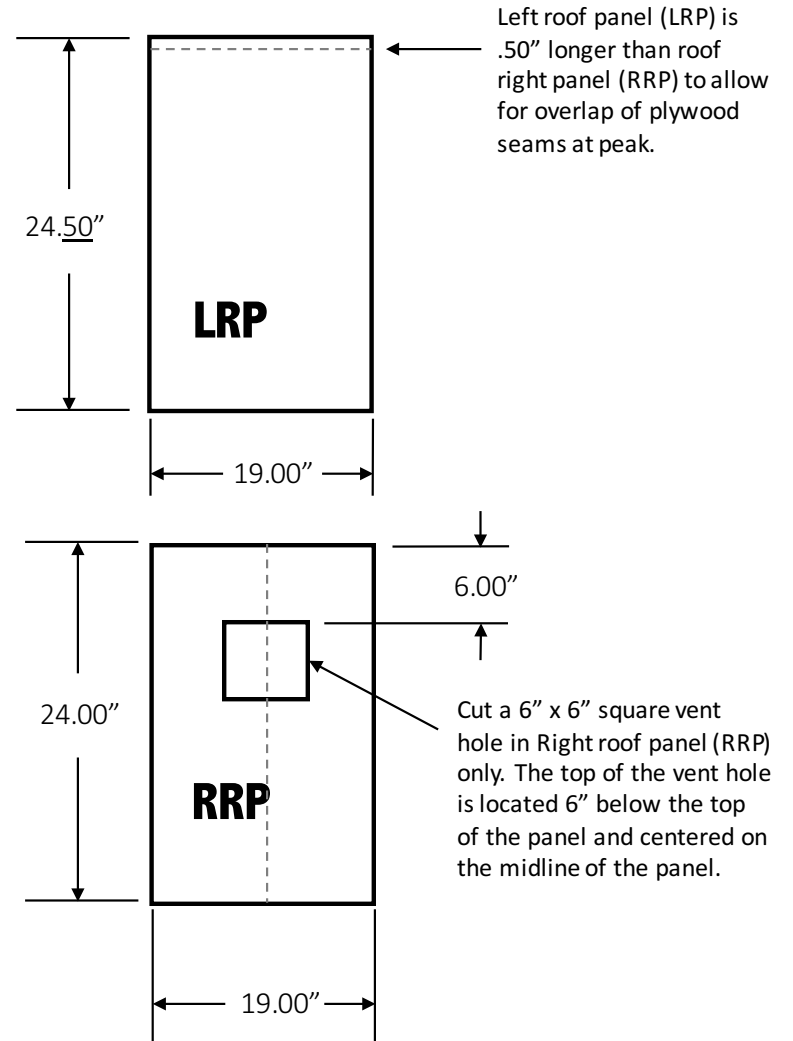
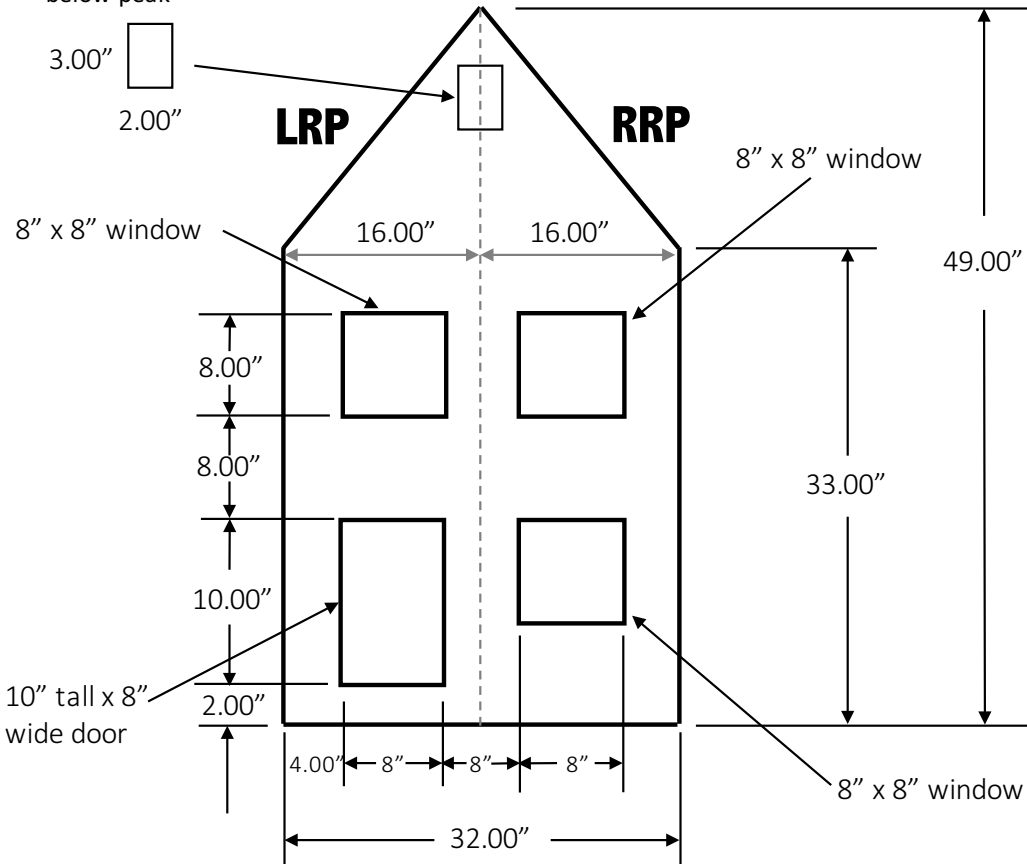
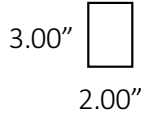


Cut an 8" x 8" square vent hole in the right floor panel. The hole should be centered in the floor panel. *THIS IS A CRITICAL STEP. DO NOT FORGET TO CUT THE 8" x 8" SQUARE OUT.*

**NOTE: NOT TO SCALE**

# FRONT PANEL

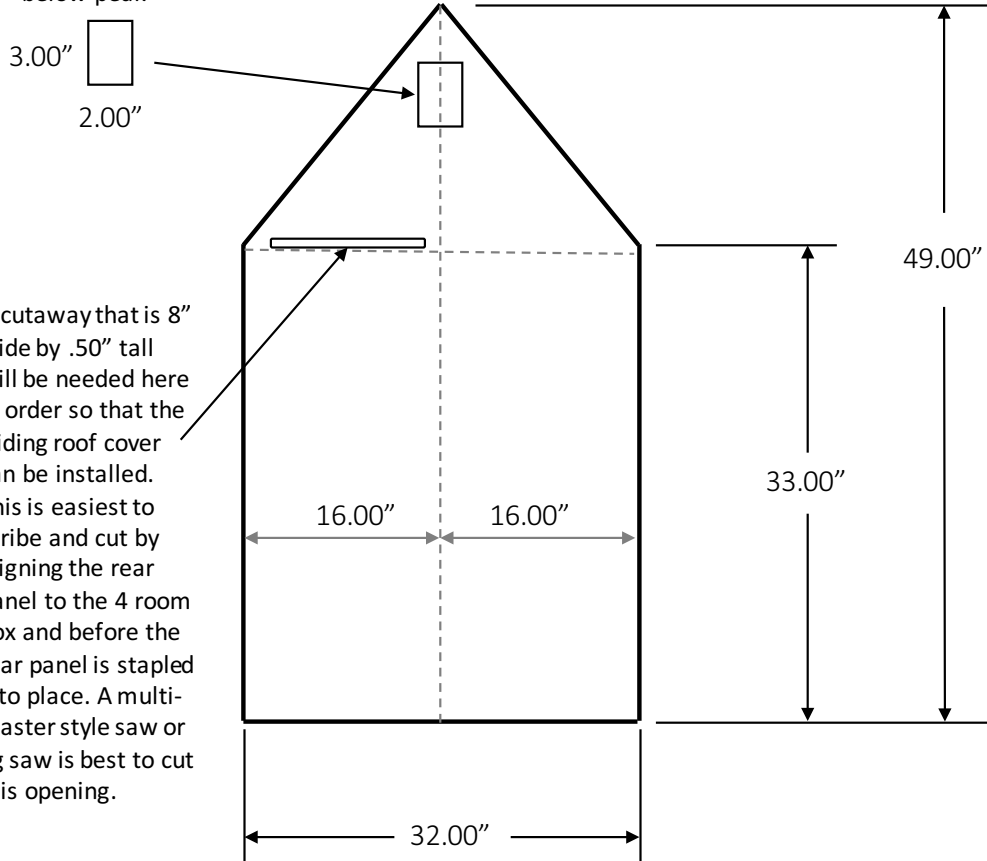
Cut 3" tall x 2" wide rectangle for gable roof vent. Located midline and just below peak



**NOTE: NOT TO SCALE**

Cut 3" tall x 2" wide rectangle for gable roof vent. Located midline and just below peak

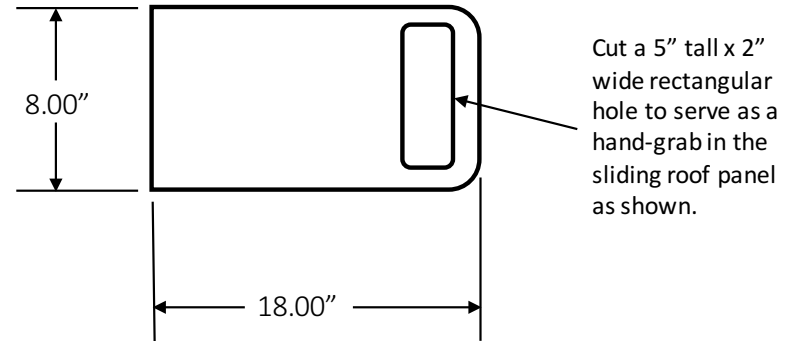
## REAR PANEL



A cutaway that is 8" wide by .50" tall will be needed here in order so that the sliding roof cover can be installed. This is easiest to scribe and cut by aligning the rear panel to the 4 room box and before the rear panel is stapled into place. A multi-master style saw or jig saw is best to cut this opening.

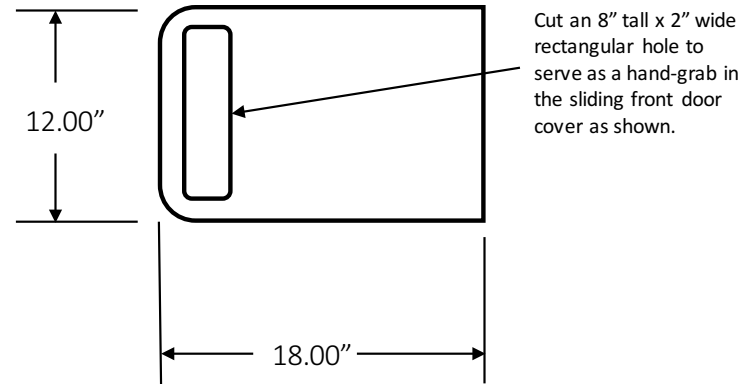
**NOTE: NOT TO SCALE**

## SLIDING ROOF COVER (NEED 2)



Cut a 5" tall x 2" wide rectangular hole to serve as a hand-grab in the sliding roof panel as shown.

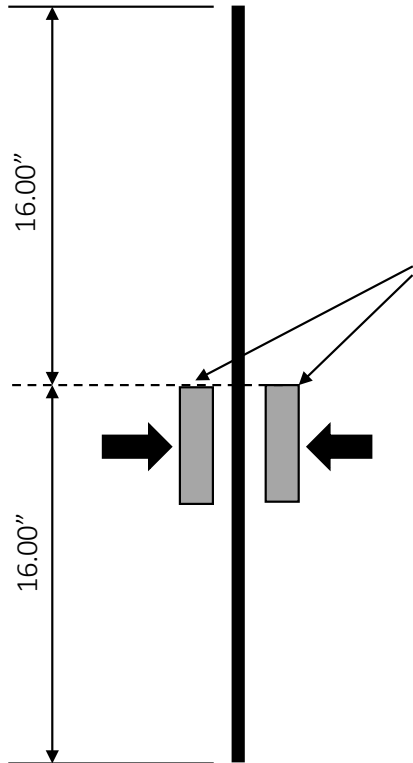
## SLIDING FRONT DOOR COVER (NEED 1)



Cut an 8" tall x 2" wide rectangular hole to serve as a hand-grab in the sliding front door cover as shown.



## CENTER PANEL

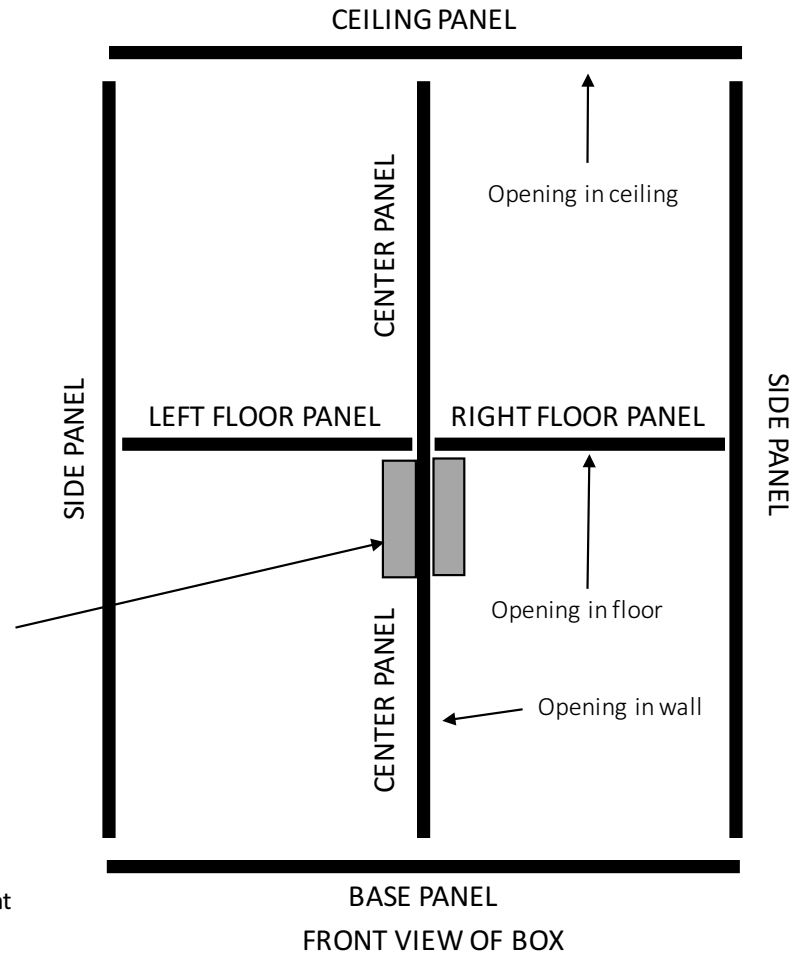


Cut two 2" x 16" strips of OSB using the 7/16" OSB and staple them to each side of the center panel. The upper edge of the strips of OSB should be level along the mid-line (16") of the center panel. The strips will be used to support the left and right side floor panels.

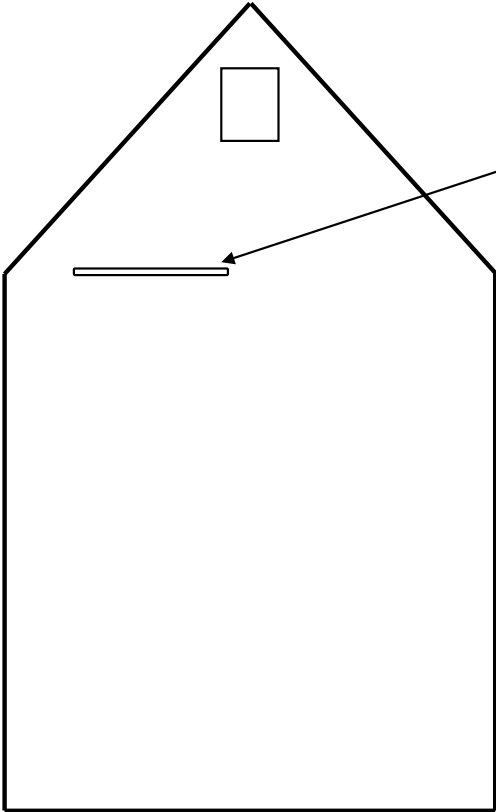
Using the center panel as your guide: Start by stapling the left and right floor panels to the OSB cleats. Next staple the left and right side panels so that the floor panels are level. This should be at the midpoint of the side panels (16"). Once the side panels are secure, staple the base panel and the ceiling panels into place. Be sure that the vent hole in the right panel floor panel and the vent hole on the ceiling panel are inline.

\*\* Caulk or construction adhesive may be necessary to seal seams around wall and ceiling seams of the four rooms. If required, this should be done now and before front and rear walls are installed.

## ASSEMBLE THE 4 ROOM BOX



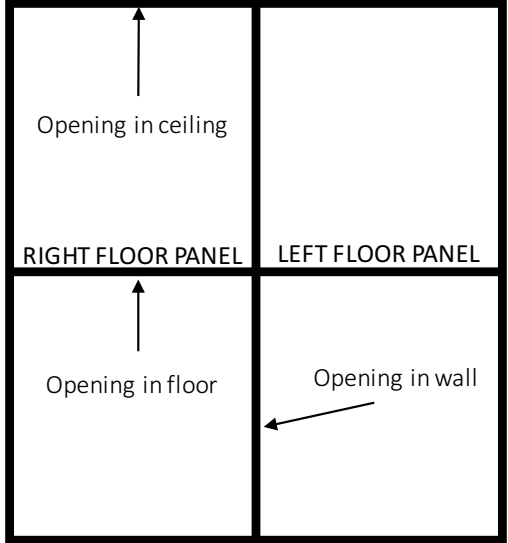
# INSTALL THE REAR PANEL



Staple the rear wall to the 4 room box. Be sure that you have scribed and cut the opening for the sliding ceiling vent cover and that it is aligned with the ventilation opening in the ceiling panel.



RIGHT SIDE WALL

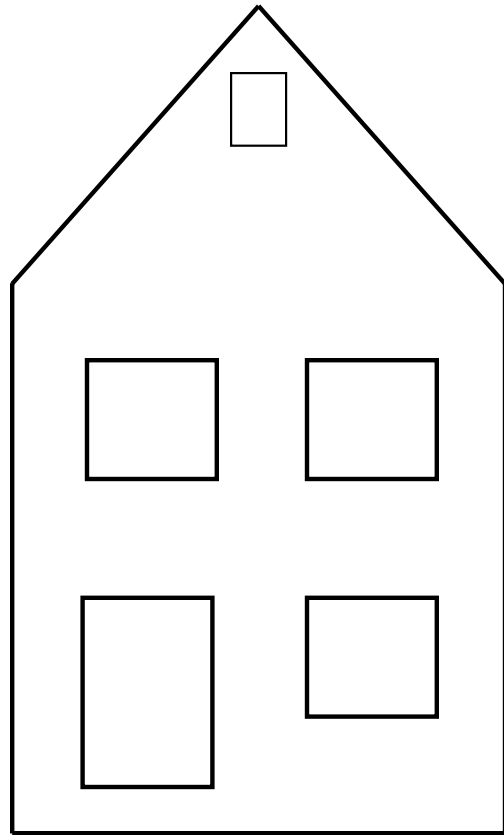


REAR VIEW OF BOX

REAR PANEL

ASSEMBLED 4 ROOM BOX

## INSTALL THE FRONT PANEL

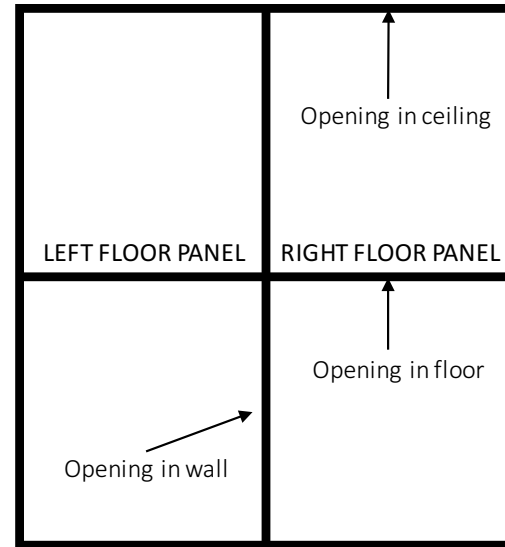


**FRONT PANEL**

Staple the front wall of the house to the front side of the box. Be sure that the ventilation openings are on the right side of the 4 room box.



## ASSEMBLED 4 ROOM BOX

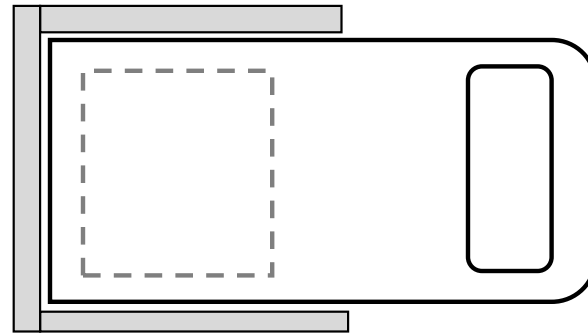


FRONT SIDE OF BOX

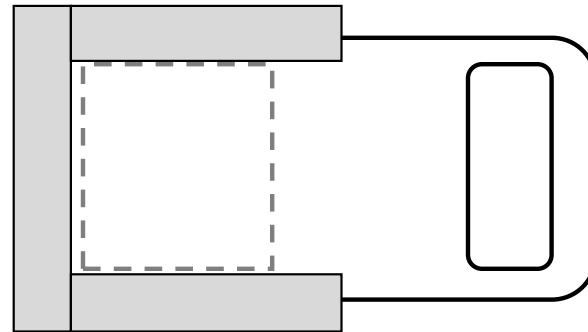


At this point, your assembled doll house should look similar to the photo on the left. Before you go any further, you will need to install plywood cleats and create a guide for the sliding ceiling cover. This is best accomplished by cutting strips of 1" and 2" OSB. Be sure to cut extra strips of 1" and 2" OSB as you will be repeating this process for the roof vent slide and the front door vent slides. The ridge pole shown in the picture is optional and not necessary for roof panel installation.

Cut and staple 1" plywood strips around perimeter.



2" plywood strips serve as a cap. Be sure to staple as close to the outer edge as possible and not to staple into the slide!

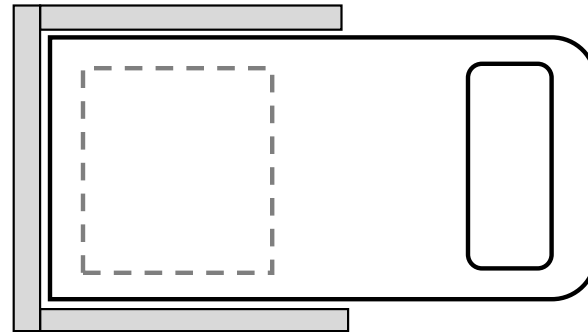




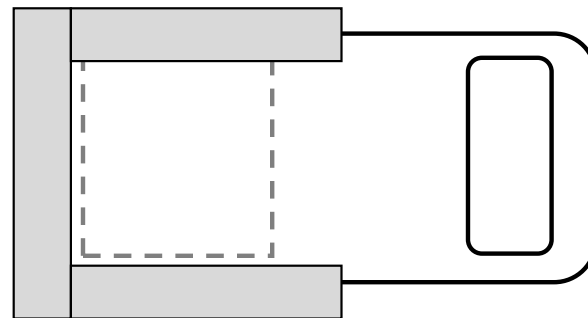
## INSTALL THE ROOF PANELS

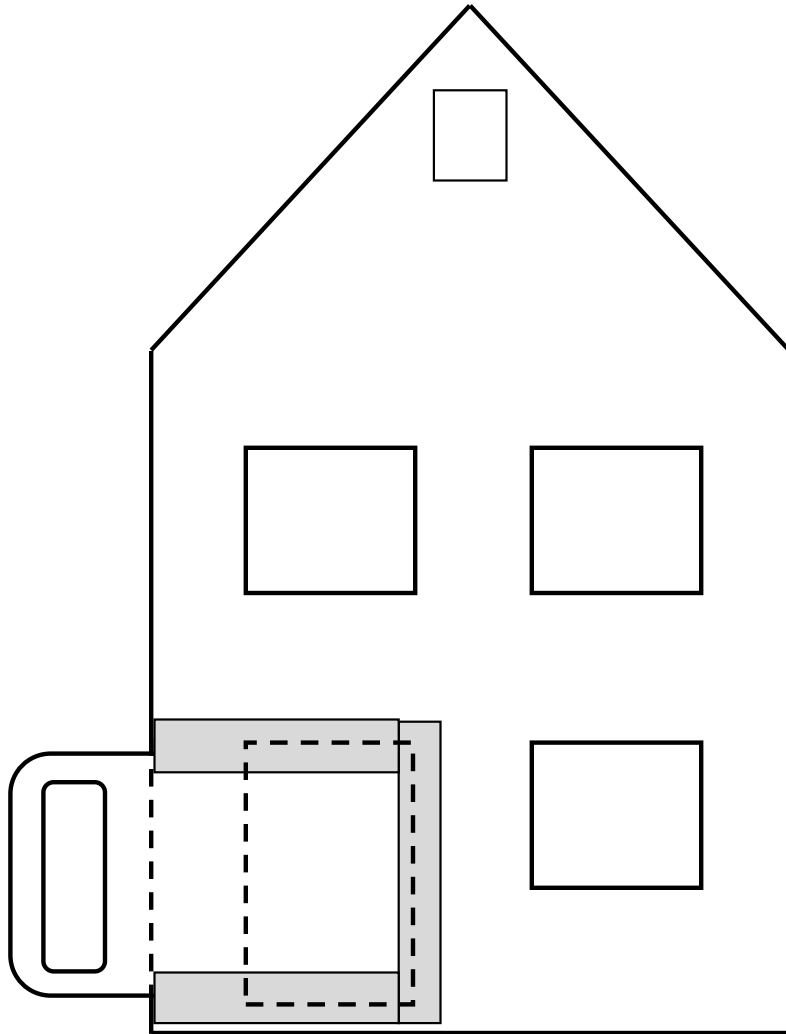
Once you have the ceiling slide cover operating properly, you are now ready to install the left and right roof panels. Center the roof panels front to back as to allow an equal distance of roof overhang (approx. 1" in front and back). Be sure that the roof vent hole is on the right side of the dollhouse and inline with the ceiling opening below. When the panels are secured and stapled to the gable ends, follow the same steps to create a track for the sliding roof vent cover.

Cut and staple 1" plywood strips around perimeter.



2" plywood strips serve as a cap. Be sure to staple as close to the outer edge as possible and not to staple into the slide!





## **INSTALL THE FRONT DOOR SLIDING COVER**

Using additional 1" and 2" OSB strips, follow the same steps for the sliding roof covers to create tracks for the front door sliding cover.



## LAST STEP – CREATE WINDOW, WALL, AND FLOOR OPENING COVERS

At this point, you should have plenty of scrap 7/16" plywood around. Before you start throwing it in the scrap pile, you will need to create five (5) covers in order to control smoke and fire gases through interior and exterior openings. Covers are needed for the following openings: windows (3), interior floor/ceiling (1), interior wall openings (1).

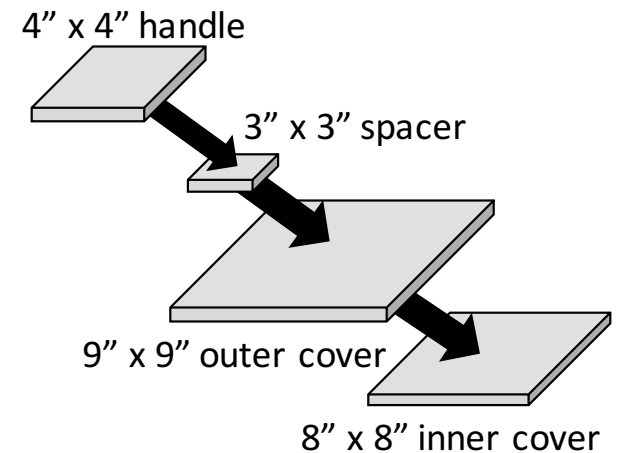
**\*\*Note:** The portion of this cover that fits into the window or wall opening must be cut and fit as precise as possible or it will not stay seated inside the window opening.

The covers may be made by creating a plywood sandwich using plywood squares, which is stapled together in the manner shown below:

### Cover locations (5 Total):

- 3 windows openings in the front.
- Wall opening on first floor between left and right side rooms.
- Floor opening between first and second floors on the right side.

★ **THIS IS A CRITICAL STEP. DO NOT FORGET TO BUILD A TOTAL OF FIVE (5) COVERS. YOU WILL NEED ALL 5 COVERS IN ORDER TO CONTROL THE SPREAD OF SMOKE, GASES, AND FIRE.** ★





## CONGRATULATIONS! THIS COMPLETES YOUR NEW DOLLHOUSE

Some other challenges that you may face:

- If you do not cut the window or door opening covers precisely, they will want to fall forward and not work as designed. If this happens, you can add an OSB guard as shown in the photo to the left to keep the covers from falling out. The guard may be fabricated at your discretion and design.
- Several people have asked about using other types or a wider thickness OSB or conventional types of plywood. The 7/16" OSB that is recommended and will provide ample burn time in order to facilitate the training exercise and has been found to be the best option for this type of training exercise.
- The gable end vents do not need a cover in order to conduct the burn and demonstrate smoke and gas movement. However, if you would like a cover for the gable end, a 2" x 3" plug fabricated in the same fashion as the other covers will work.
- This completes the instructions for the dollhouse. Good luck with your training. Questions or problems with the interpretation of these plans may be directed to Matt Palmer at [mpalmer351@me.com](mailto:mpalmer351@me.com) . Thank you.

Matt Palmer

Captain, Stamford (CT) Fire Department  
Director of Training , Cheshire (CT) Fire Department

**17 - END**

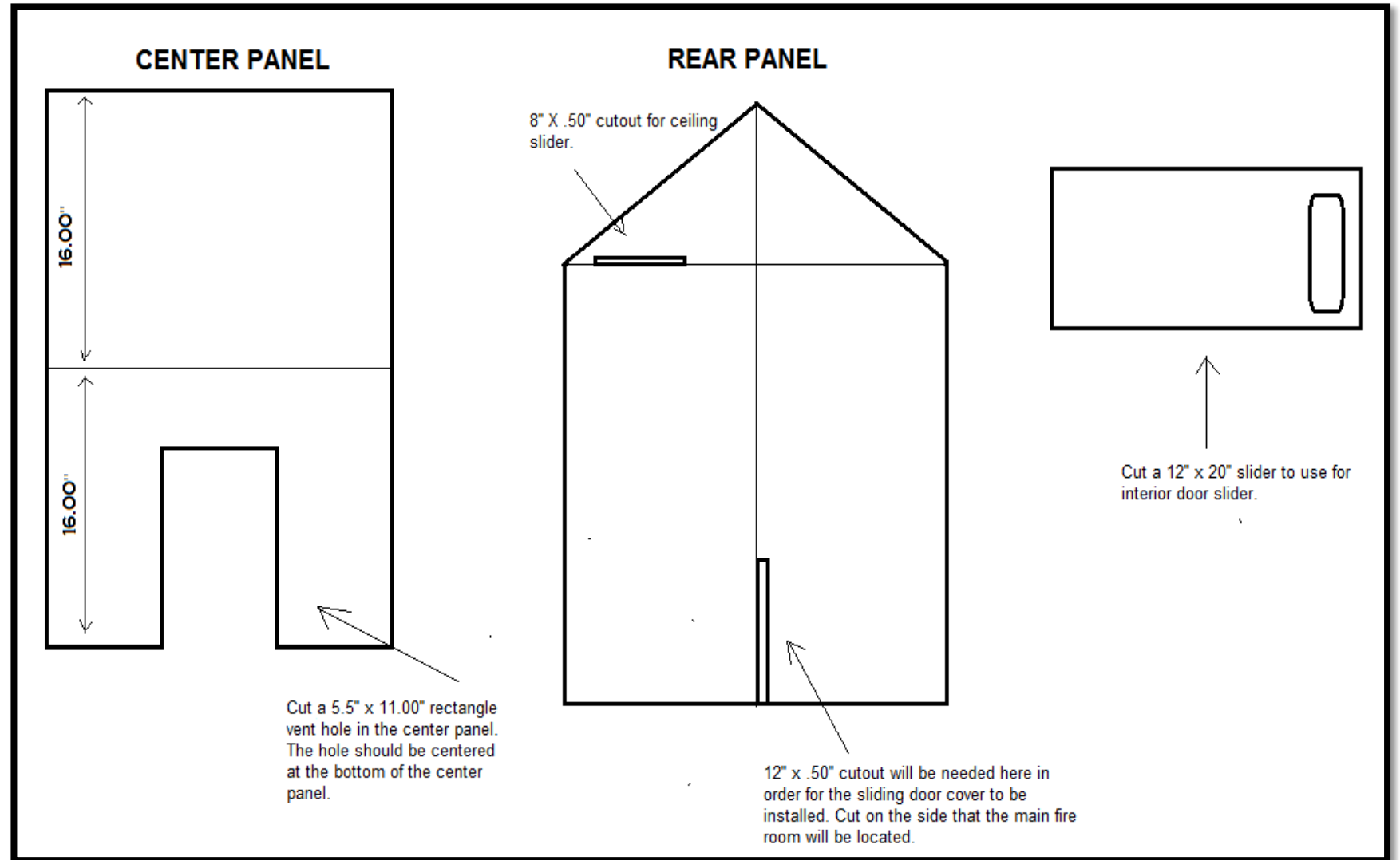




# Modification to the Small Scale Fire Behavior “Palmers Dollhouse”

This modification is to change the opening size and control mechanism located in the center panel. Following these direction will alter the middle panel opening between the lower left and lower right compartment.

We thank Lt. OJ Kolodziej, Lt. Brannon Vernon, FF. Drew Gargus and FF. Luke Ahl from Birmingham Fire and Rescue station 1 for this modification.



We have Lt. OJ Kolodziej’s video of this modification being used located here - <https://youtu.be/7Q2-8bHwvKc>