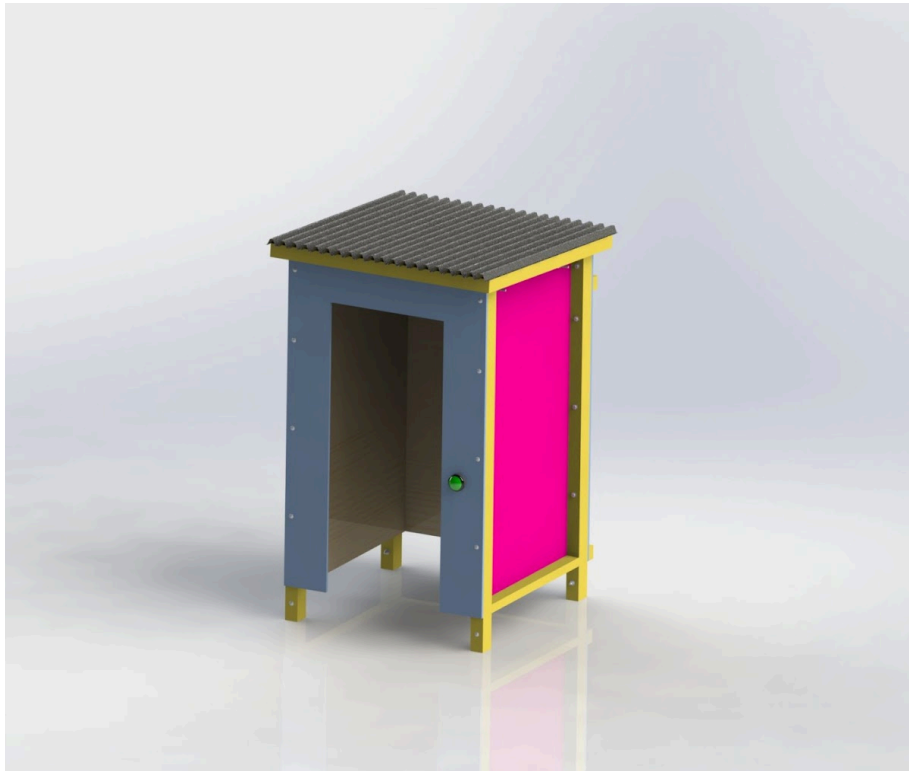


Construction Guide and Design Proposal for a Mobile Exhibit



Prepared for

The Cape Town Museum of Childhood

Date

16 December 2022

INTRODUCTION

The purpose of this guide is to provide a complete overview of the work completed and ideas suggested by the team composed of Trevor Faber, Grace McCarthy, Patrick McKenna, and Grace Solod from the Worcester Polytechnic Institute. The document presents the proposed message, structure, and contents of the mobile exhibit, as well as CAD designs, blueprints, and cost estimates to make the transition of this exhibit from idea to reality as smooth as possible.

MESSAGE

Through the analysis of survey data, assessment of interview responses, and multiple brainstorming sessions with various groups, we settled on the following message for the mobile exhibit: ***Celebrating diverse childhood stories***. The concept of diversity is broad and multi-faceted, and can address differences between people such as age, race, location, gender, and ability, among many other characteristics. Within this message, we developed the following three learning goals for the exhibit to address:

1. I want the visitors to learn how to be aware of different childhood experiences.
2. I want the visitors to learn how to be understanding of different childhood experiences.
3. I want the visitors to learn how to be empathetic towards others, especially children.

If successful in achieving its goals, the exhibit will act as a resource for people of all ages to become aware of and develop an understanding of the diverse range of childhood experiences. In the bigger picture, this level of understanding, when adopted by a majority of the population, can create a safer world for children.

STRUCTURE

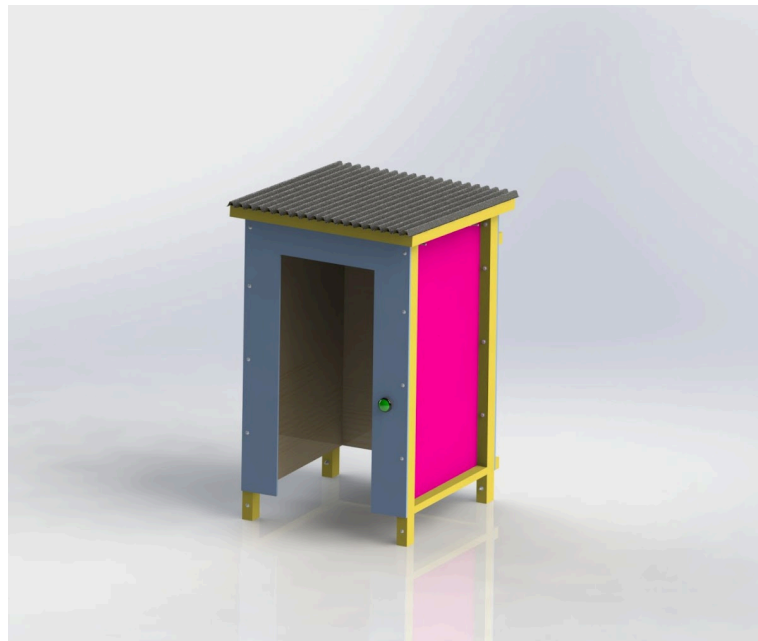


Figure 10. Immersive Story Booth CAD Rendering.

Our design plans for a total of four immersive booths. The booths were designed with the following design parameters in mind:

- Portable
- Easy to assemble
- Immersive
- Striking
- Structurally sound
- Ability to stand alone

To booth consist of the following to address these design parameters.

Each booth will be created out of five sub sections, a front panel, two side panel, rear panel and a roof. The panels and roof will be bolted together with 24 carriage bolts, washers and nuts at the joint of the structural frame of each panel. The bolts can be easily installed and uninstalled with minimal tools, a simple wrench and mallet will allow for the exhibit to be assembled anywhere. As each panel comes together the structural frame combines to create four posts to support the booth. This bolt design allows for a booth that can be transportable and structurally sound while still allowing each booth to be assembled by two people in under 20 minutes. The implementation of an impact drill would further reduce the assembly time. To visualize the construction process, we created the following video which shows exactly how each part comes together to form the final product: <https://youtu.be/2eYHhbzCuc8>.

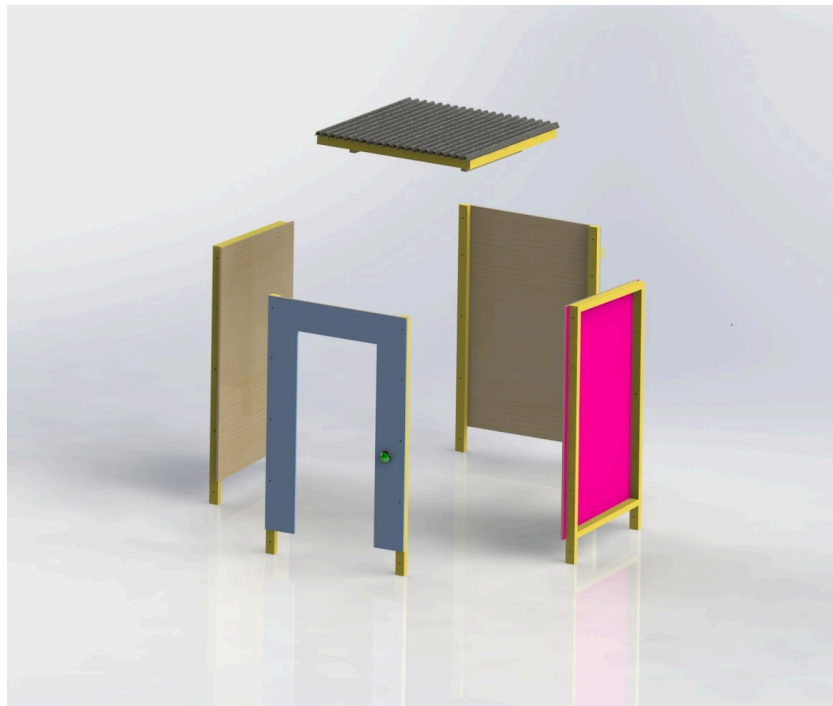


Figure 1. Immersive story booth below out rendering, showcasing the five sections of the mobile exhibit

The five sections make the booths easy to transport, all sides of the booth can be carefully stacked and placed in the back of a bakkie (pick-up truck). Separating each panel with a blanket will ensure safe transportation without damaging any of the interior work or exterior paint. Besides the panels the only other aspects of the exhibit that need to be transported are the hardware, and any arts and crafts material associated with the fourth booth.

The five-section design also opens up the possibility to easily change the contents of the interior of the booths. Using a wallpaper method would allow for new interiors to be rolled onto each side individually.

The booth has been designed to account for a slight roof slant causing the entrance of the booth to have a height of 2.1 meters and the rear 2 meters. This slant serves the purpose of allowing any rainwater to run off the roof without pooling up. Each booth will have an open bottom to allow for ventilation and air circulation on hot days. The interior of the booth has basic dimensions of 1 meter wide, 1.2 meters deep and 2 meter high. These dimensions were derived from two factors, available building material and creating an experience that can be shared between a parent and their child. Plywood comes in 1.22-meter-wide sections so for the sake of simplicity the booth was designed to use the plywood sheets without the need of cutting down their width or using more than one sheet per side. These dimensions also allow for a space that can accommodate an adult and two small children, curating an immersive experience with enough room for it to be shared between an adult and a child.

To continue to encourage an immersive experience the interior walls of the exhibit have been designed to be uninterrupted, meaning the interior post of beams, allow for a seamless flow of ideas from wall to wall. The doorway to the booth will be covered by a curtain, making the booth its own room. A battery powered motion light mounted to the roof of the booth will light up to exhibit, further changing the atmosphere. It will be important for the light to be mounted directly above therefore not casting any shadows obstructing the interior. Speakers on either side wall of the exhibit, creating a surround sound feel. It is important that the speakers are also battery powered allowing the booths to operate without relying on access to electricity.

All the materials for the booths can be sourced locally from South African vendors, Somerset Timbers has all the wood available to build each booth. The frame of each panel is made from 50mm x 76mm structural pine, the roof incorporates 76mm x 114mm structural pine along with 36mm x 50mm structural pine runners. The walls are made from 18mm exterior plywood although it should be noted that the booth could be built out of slightly thinner plywood with the same blueprints to save money. The roof will be made from corrugated sheet metal.

To protect against weathering all structural wood should be treated to H2 standard. A further coat of clear polyurethane will be beneficial in further protecting the frame and any exterior paint. While moving the booths to a new spot the ground they are being placed on must be considered. If placed in dirt concrete footing will help protect the post against rot.

The final consideration is connecting the storytelling booths back to the museum of childhood. This can be done two ways, using the museum's color scheme and including a QR code for the virtual tour within the mobile exhibit.

BLUEPRINTS

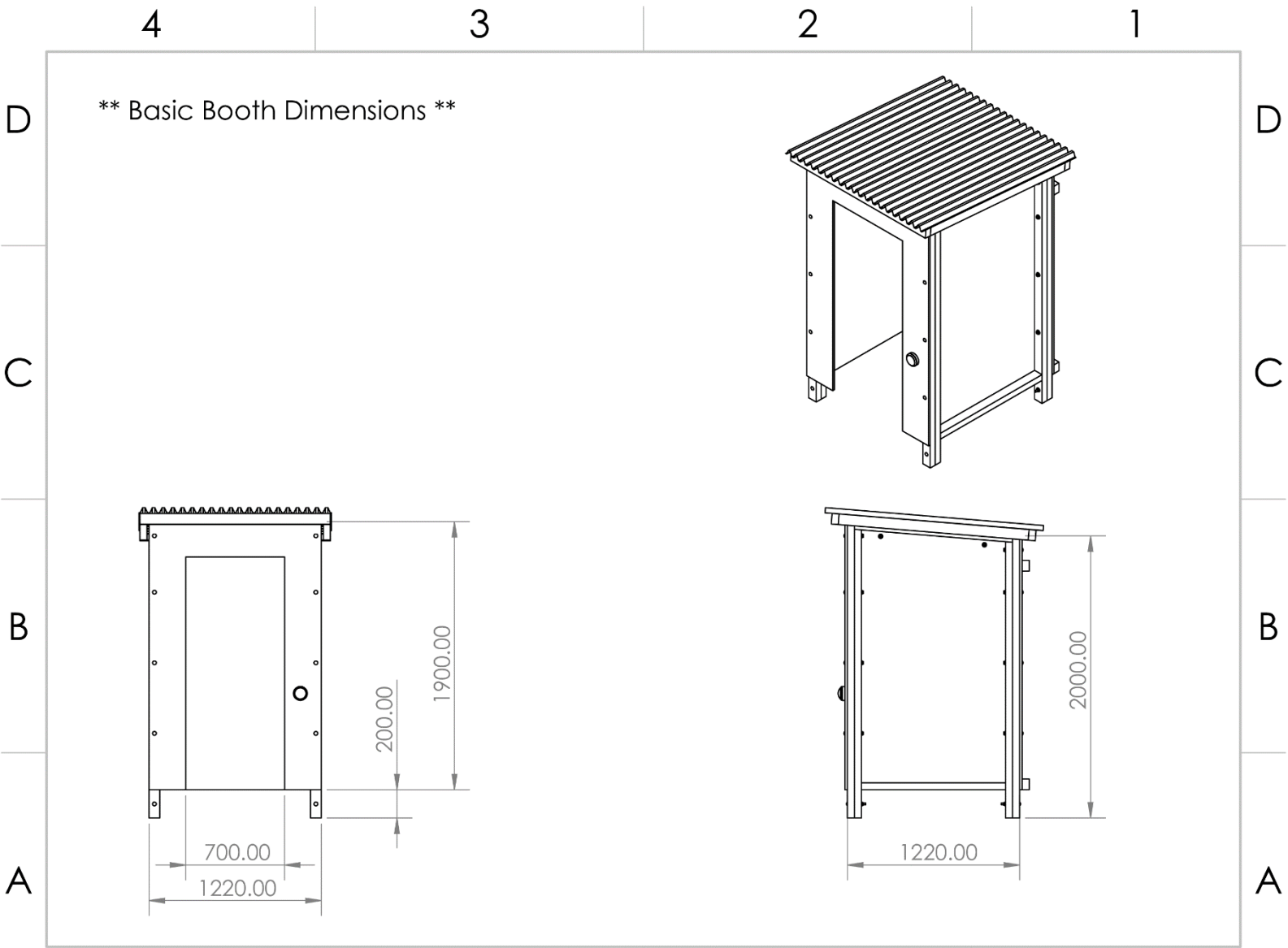
In an effort to make it as easy as possible for the museum to capitalize on the physical design of the Story Booth a series of blueprints have been developed. The blueprints start with a

full assembly view and then break down into each subassembly (each of the five sections) and then further breaks down into each individual part of each sub assembly. The table of parts on each assembly drawing allows the viewer to establish which parts correlate to the parts within each sub assembly.

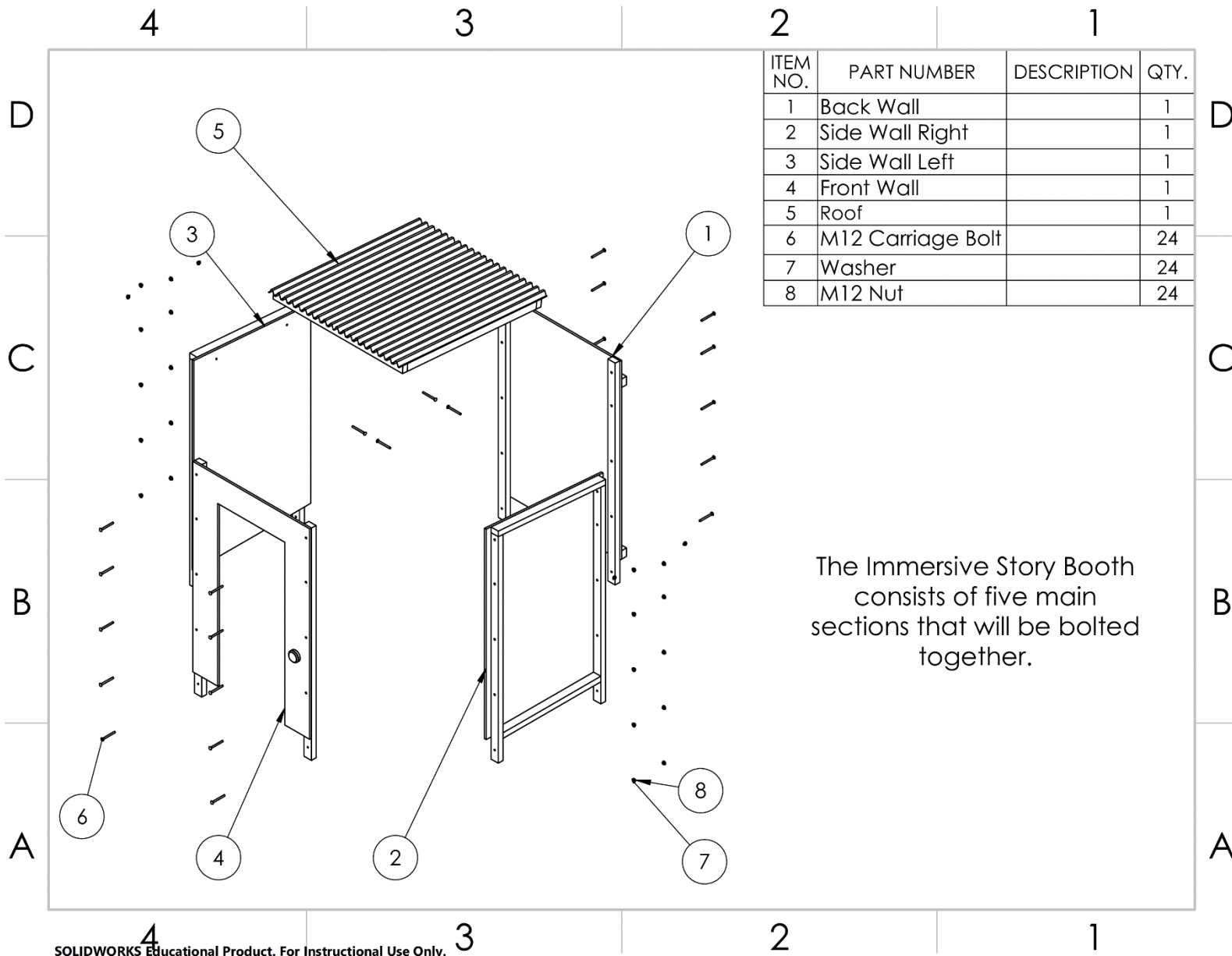
Table 1. Estimated Material Cost (wood cost were projected based on Somerset Timbers price catalog)

ITEM NO.	PART NUMBER	QTY.	Estimated Length of Material (meters)	Cost per Meter	Cost per Unit	Total Cost
1	Pine Exterior Ply Rear	1			931.99	931.99
2	Structural Pine Rear Vertical Runner	2	2.01	35.22	70.7922	141.5844
3	Structural Pine Rear Horizontal Runner	2	1.22	35.22	42.9684	85.9368
4	Pine Exterior Ply Side	2			931.99	1863.98
5	Structural Pine Side Vertical Front Runner	2	2.05	35.22	72.201	144.402
6	Structural Pine Side Vertical Rear Runner	2	2.01	35.22	70.7922	141.5844
7	Structural Pine Side Horizontal Top Runner	2	1.13	35.22	39.7986	79.5972
8	Structural Pine Side Horizontal Bottom Runner	2	1.02	35.22	35.9244	71.8488
10	Pine Exterior Ply Front	1			931.99	931.99
11	Structural Pine Front Runner	2	2.1	35.22	73.962	147.924
18	Structural Pine Roof Front Beam	2	1.35	35.22	47.547	95.094

19	Structural Pine Roof Side Beam	2	1.35	35.22	47.547	95.094
20	Structural Pine Roof Attachment Runner	2	0.94	55	51.7	103.4
21	Structural Pine Roof Runner	5	1.25	35.22	44.025	220.125
22	Sheetmetal	2				500
23	M12 Carriage Bolt	24				500
24	Washer	24				0
25	M12 Nut	24				0
Total R						6054.5506

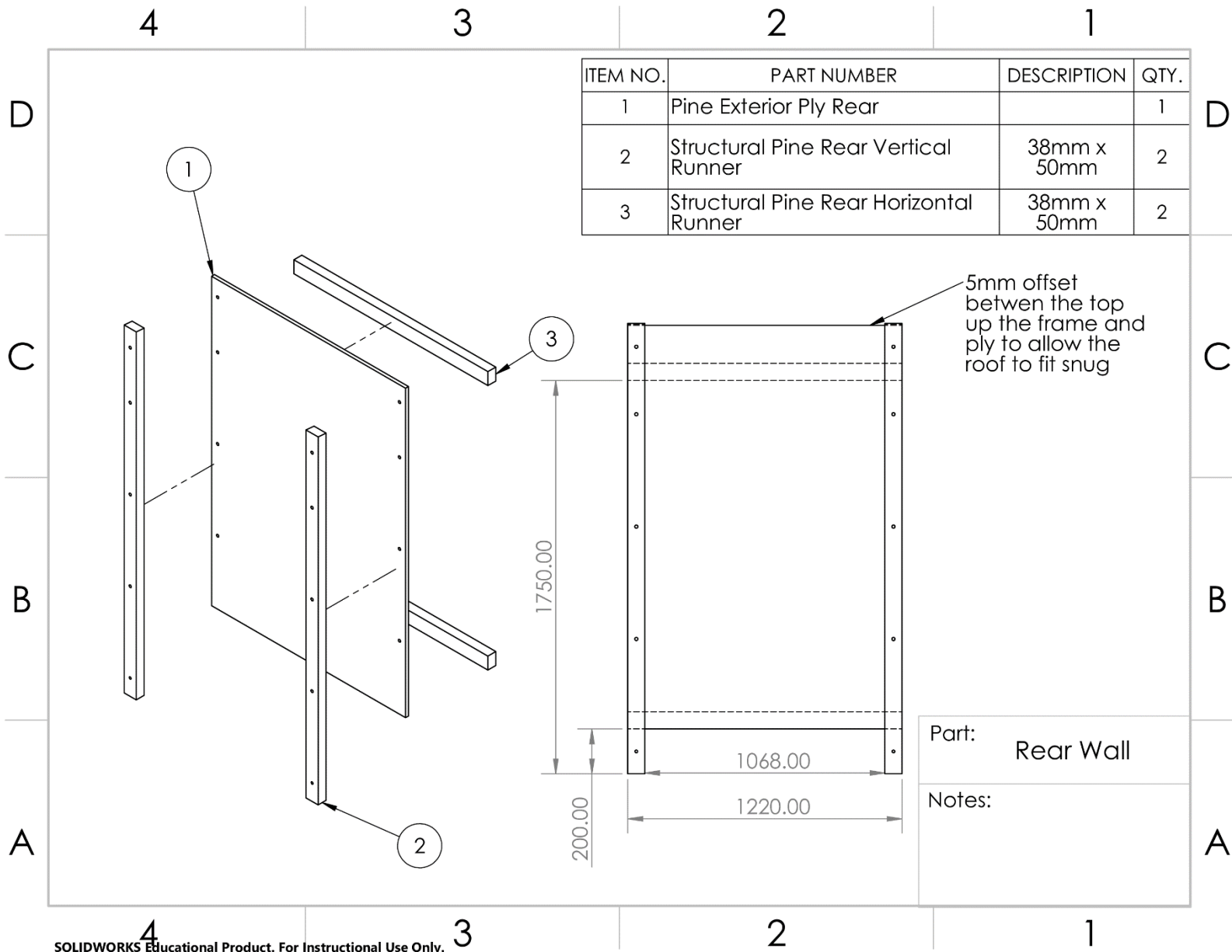


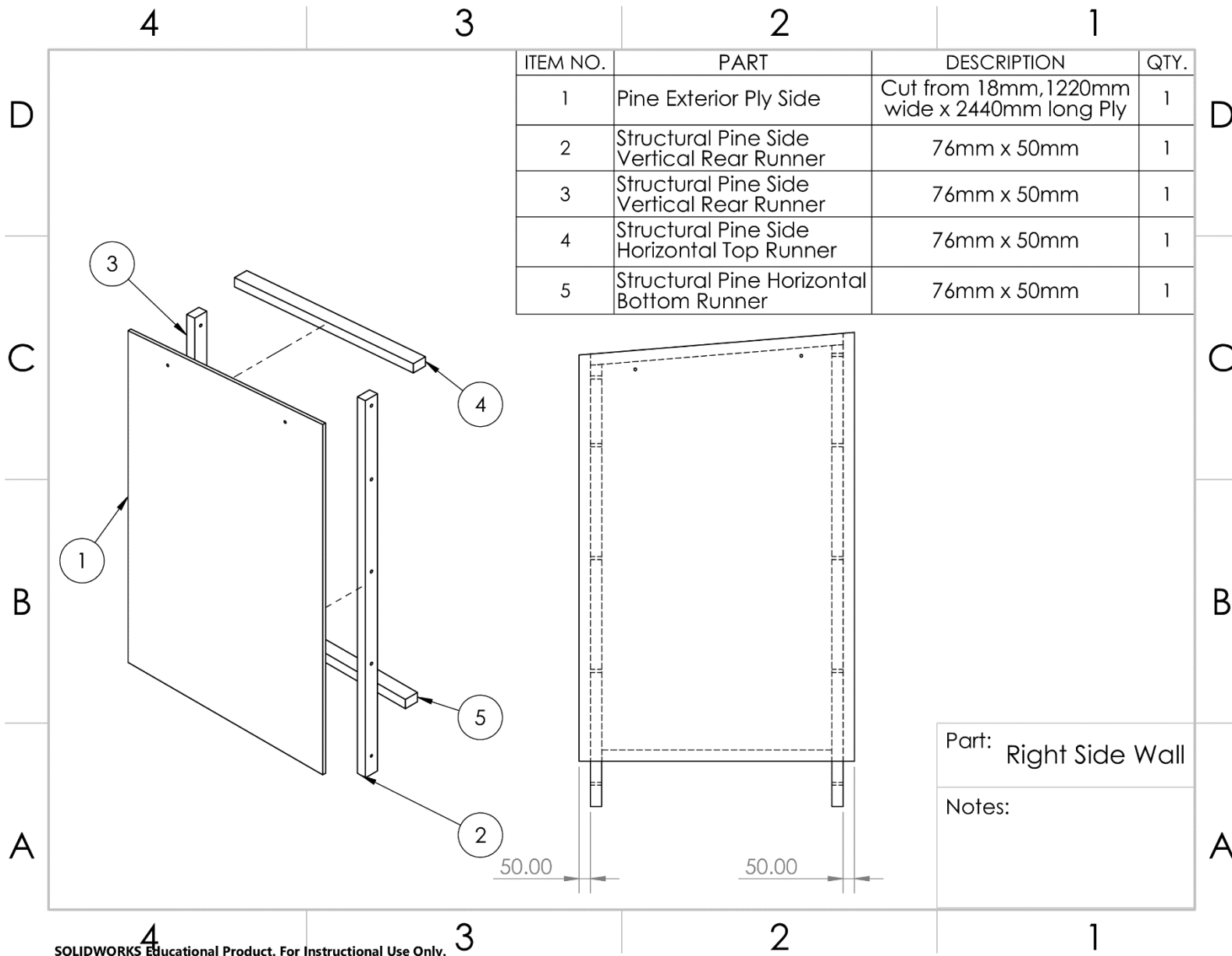
SOLIDWORKS Educational Product. For Instructional Use Only.



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Back Wall		1
2	Side Wall Right		1
3	Side Wall Left		1
4	Front Wall		1
5	Roof		1
6	M12 Carriage Bolt		24
7	Washer		24
8	M12 Nut		24

The Immersive Story Booth consists of five main sections that will be bolted together.

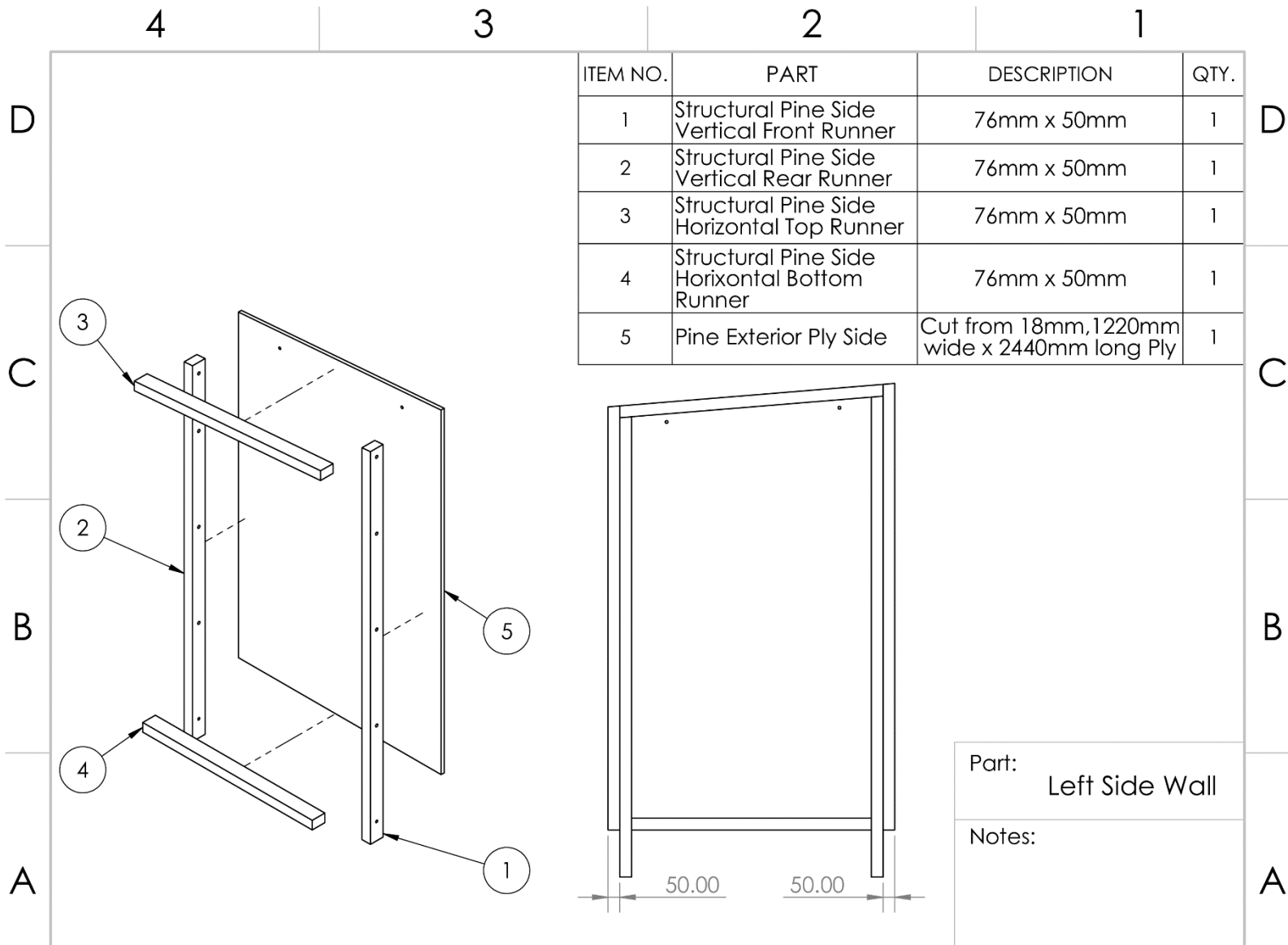




ITEM NO.	PART	DESCRIPTION	QTY.
1	Pine Exterior Ply Side	Cut from 18mm, 1220mm wide x 2440mm long Ply	1
2	Structural Pine Side Vertical Rear Runner	76mm x 50mm	1
3	Structural Pine Side Vertical Rear Runner	76mm x 50mm	1
4	Structural Pine Side Horizontal Top Runner	76mm x 50mm	1
5	Structural Pine Horizontal Bottom Runner	76mm x 50mm	1

Part: Right Side Wall

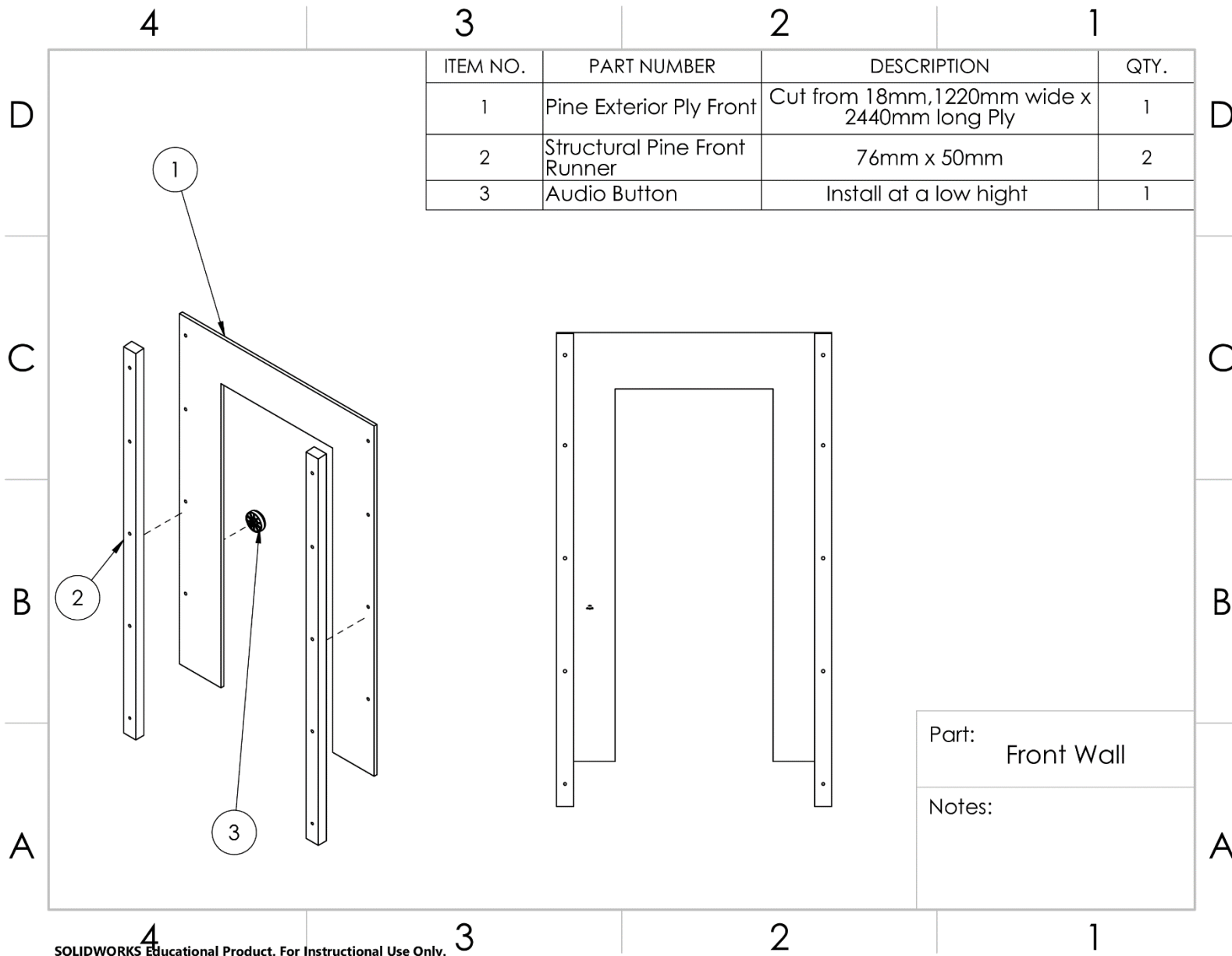
Notes:



ITEM NO.	PART	DESCRIPTION	QTY.
1	Structural Pine Side Vertical Front Runner	76mm x 50mm	1
2	Structural Pine Side Vertical Rear Runner	76mm x 50mm	1
3	Structural Pine Side Horizontal Top Runner	76mm x 50mm	1
4	Structural Pine Side Horizontal Bottom Runner	76mm x 50mm	1
5	Pine Exterior Ply Side	Cut from 18mm, 1220mm wide x 2440mm long Ply	1

Part: Left Side Wall

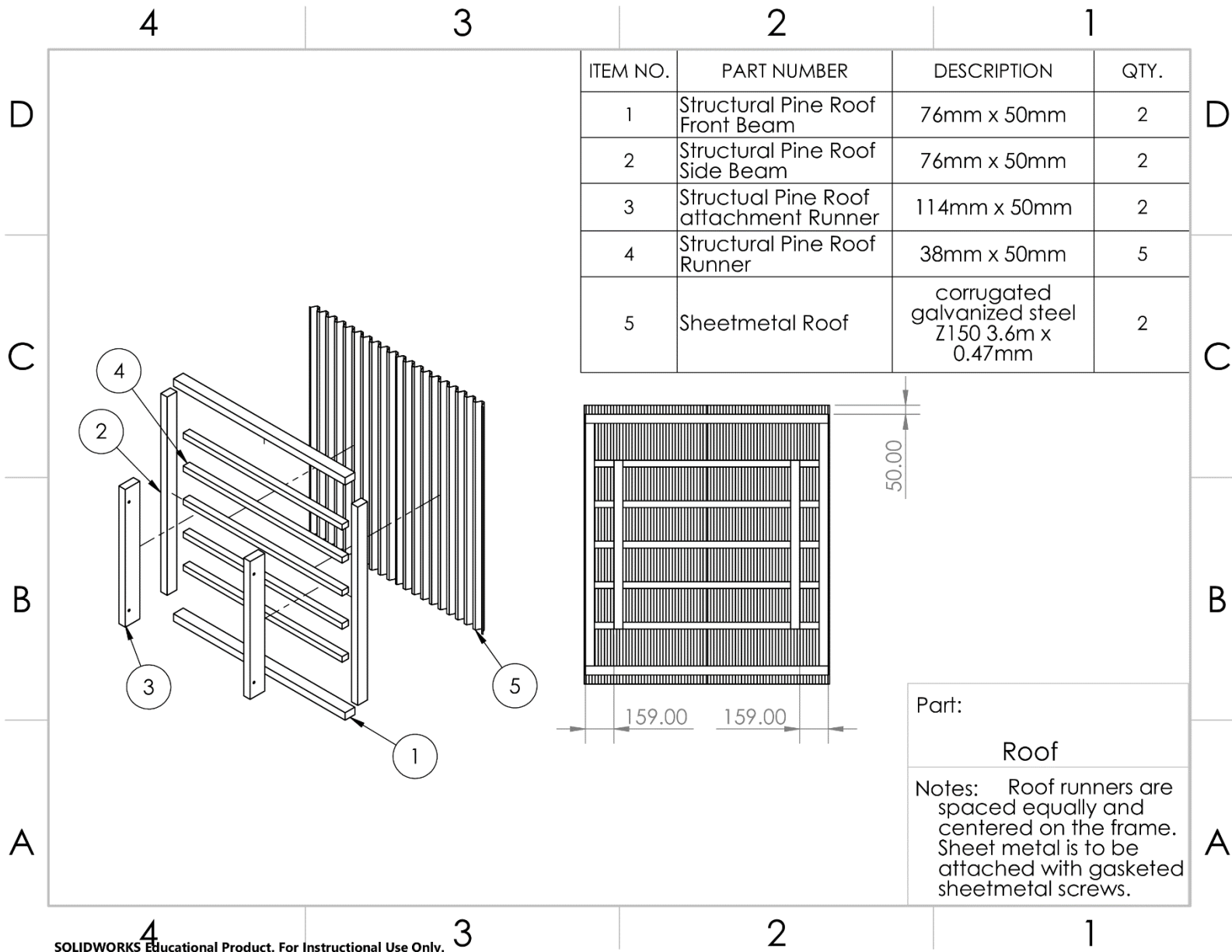
Notes:

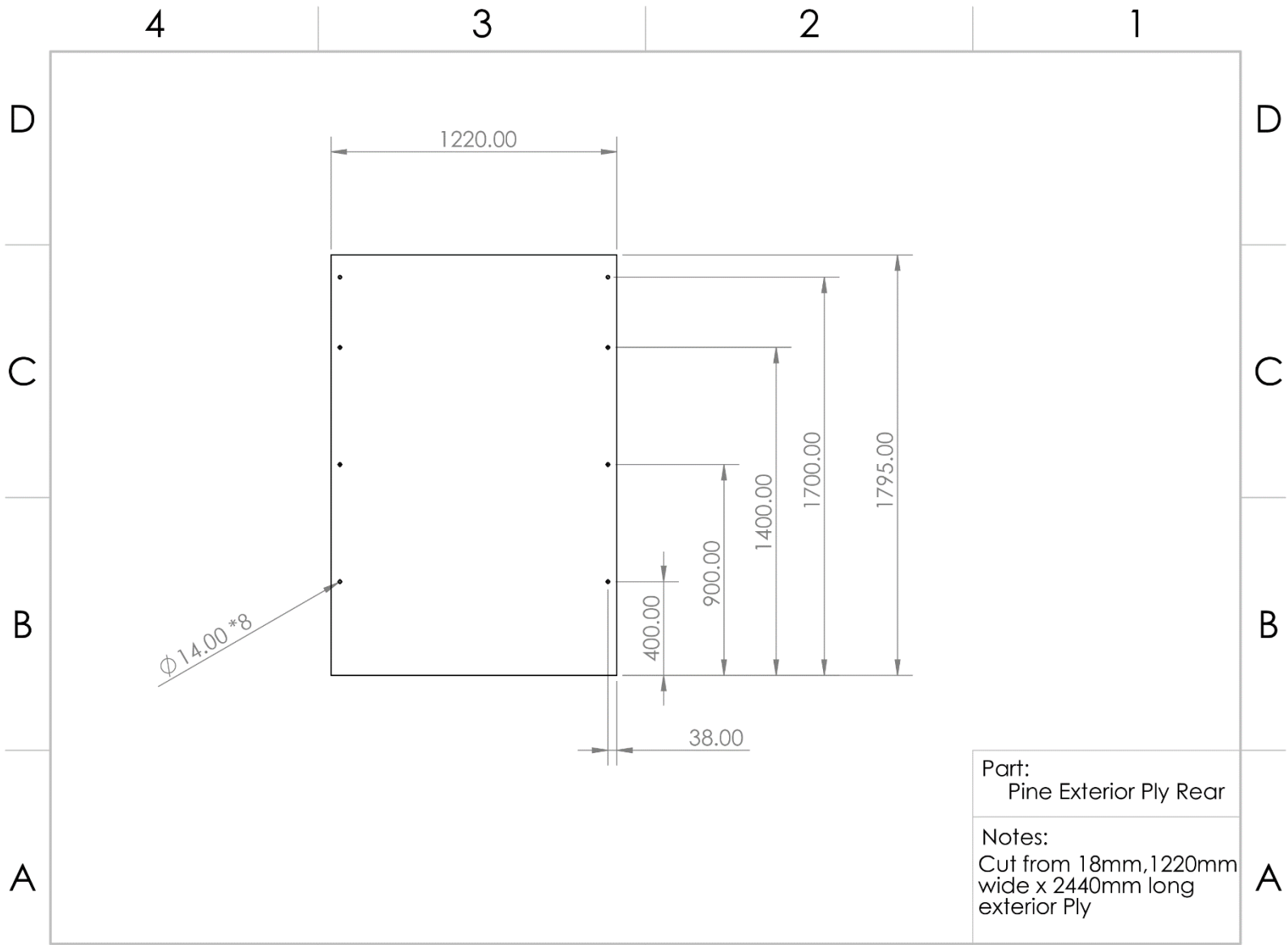


ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Pine Exterior Ply Front	Cut from 18mm, 1220mm wide x 2440mm long Ply	1
2	Structural Pine Front Runner	76mm x 50mm	2
3	Audio Button	Install at a low height	1

Part: Front Wall

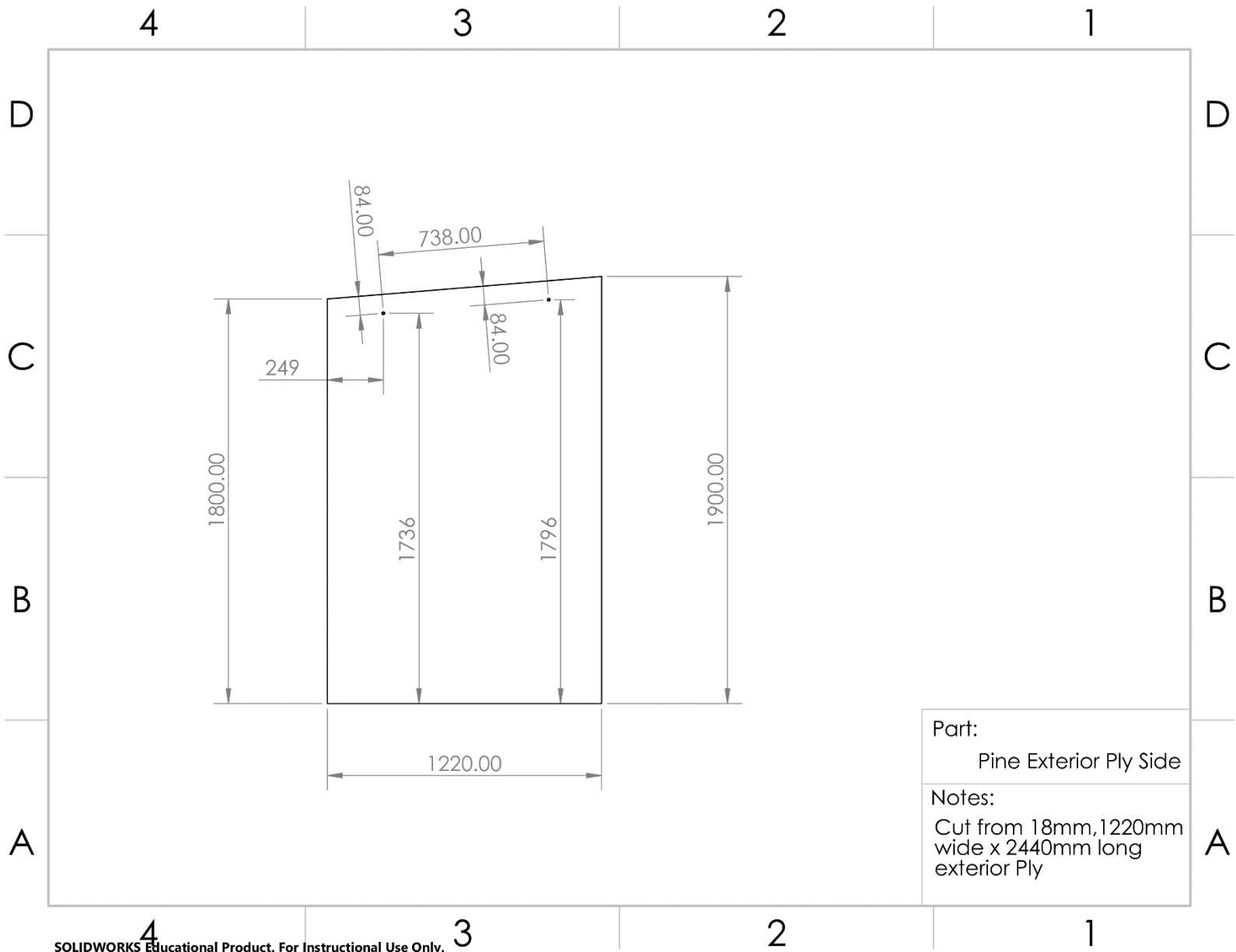
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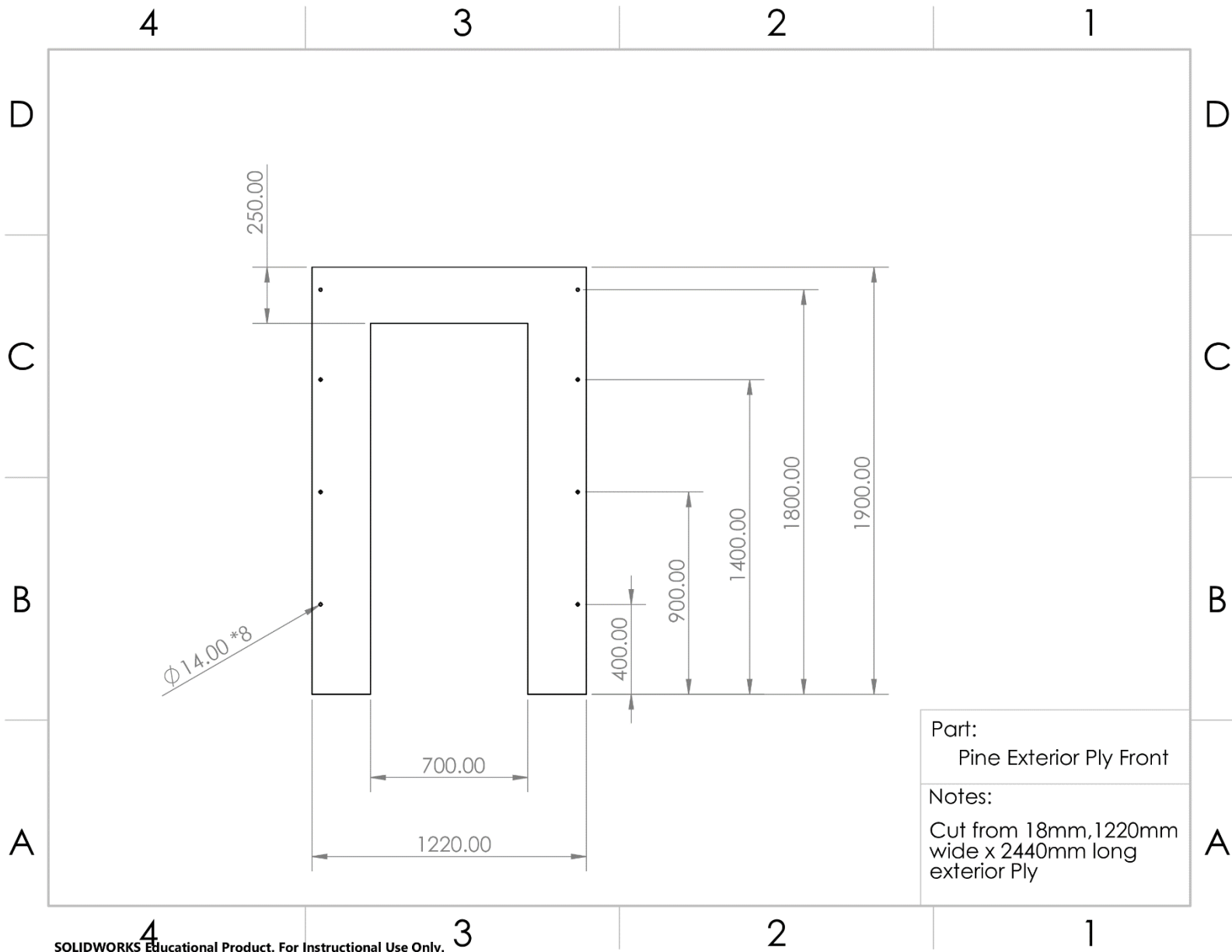




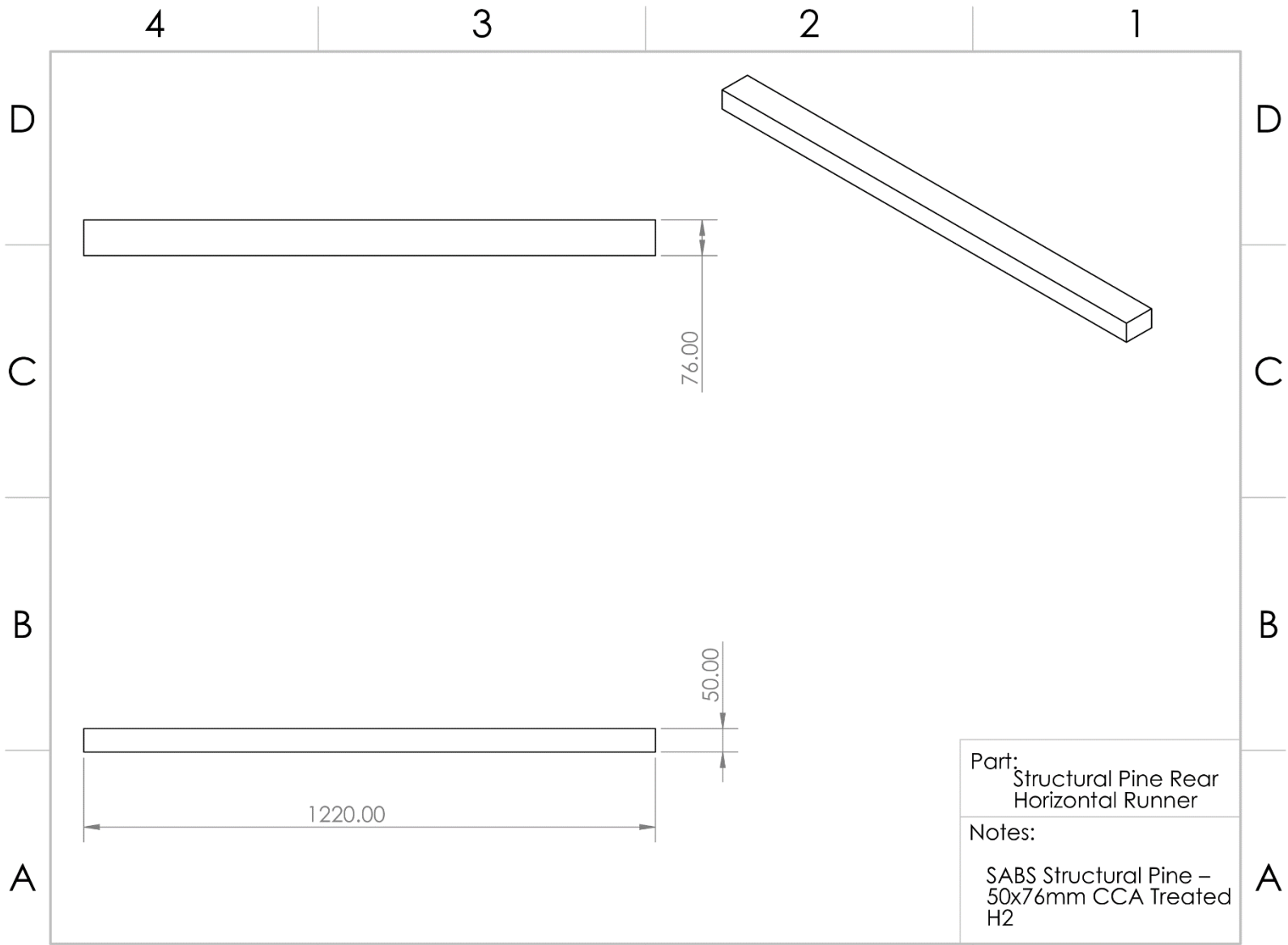
Part:
Pine Exterior Ply Rear

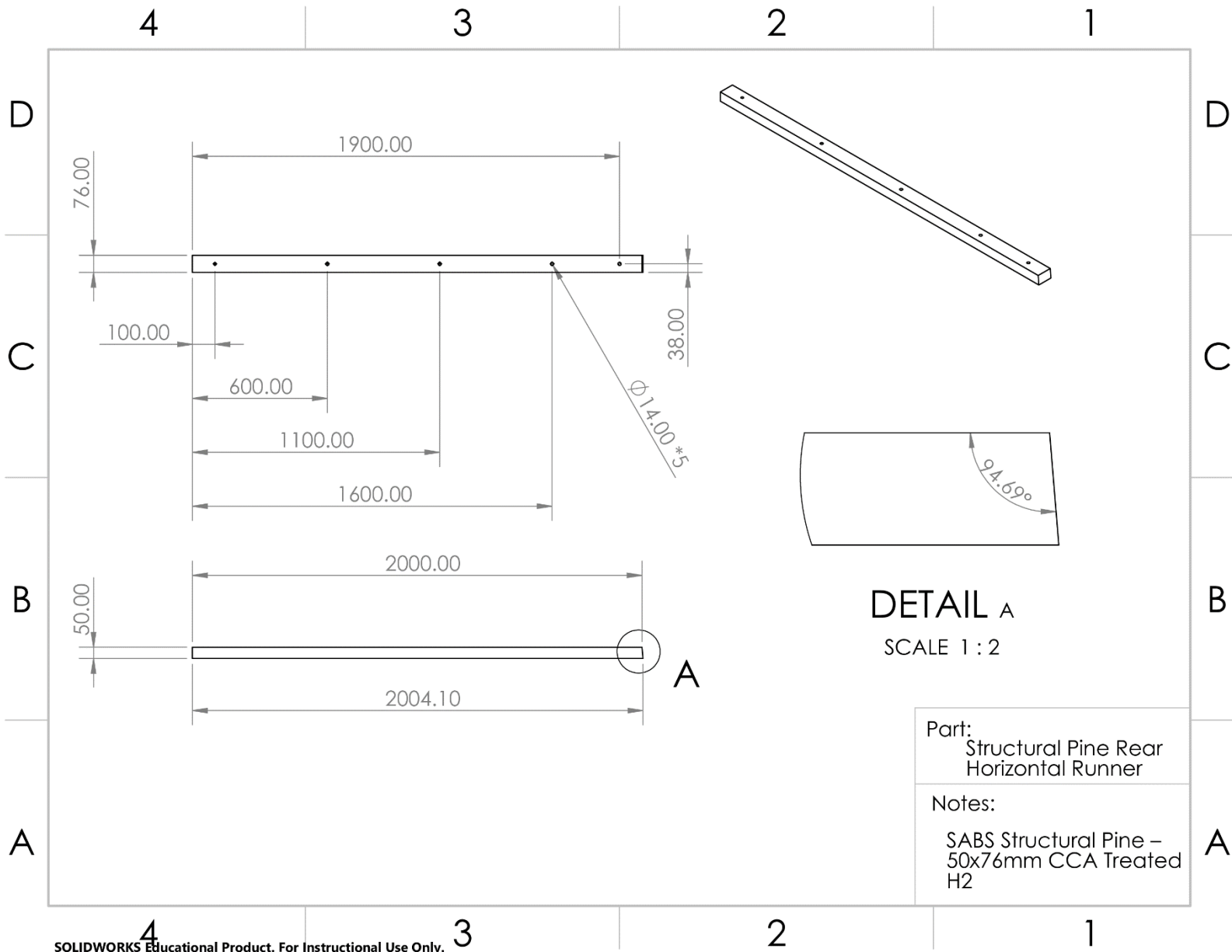
Notes:
Cut from 18mm, 1220mm
wide x 2440mm long
exterior Ply

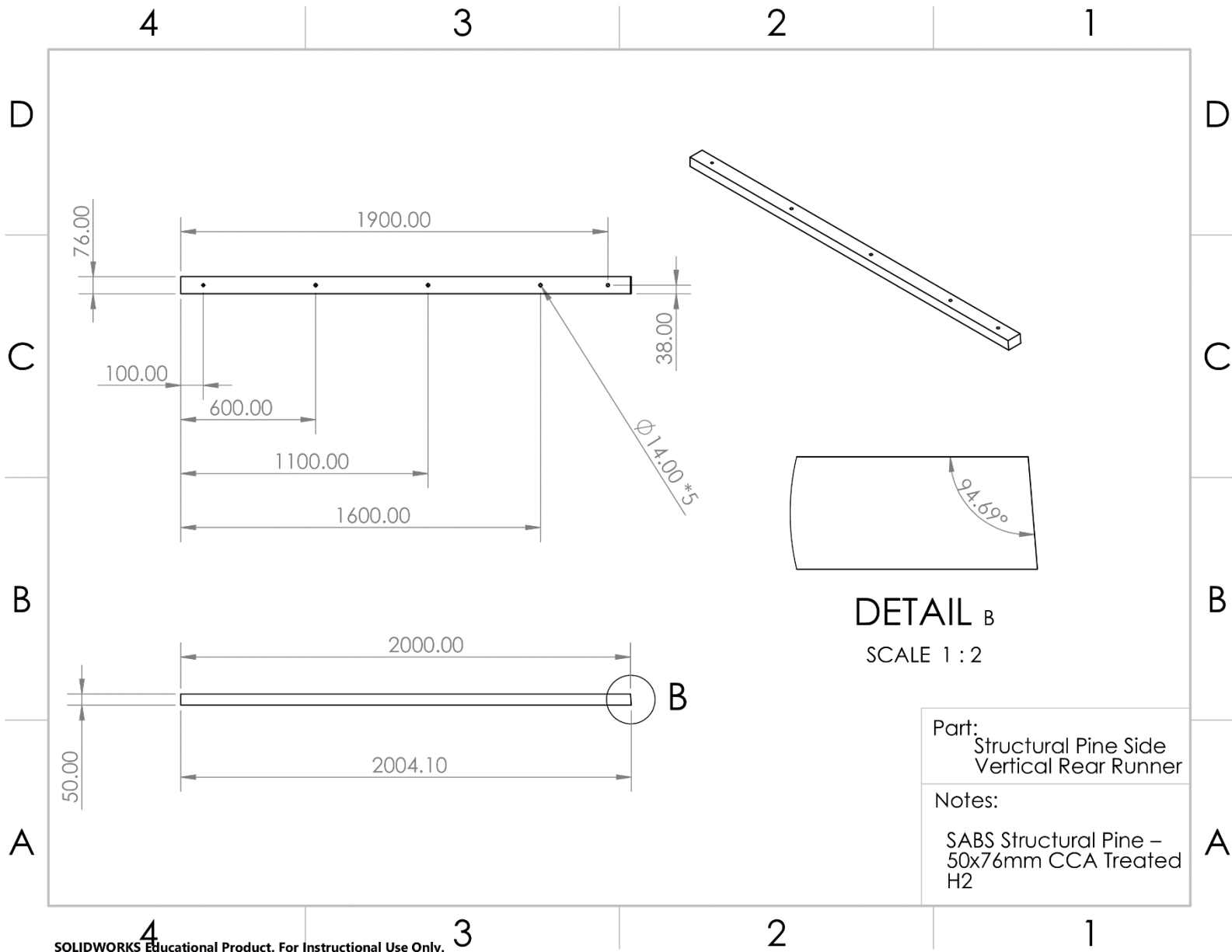




Part:
Pine Exterior Ply Front
Notes:
Cut from 18mm, 1220mm wide x 2440mm long exterior Ply



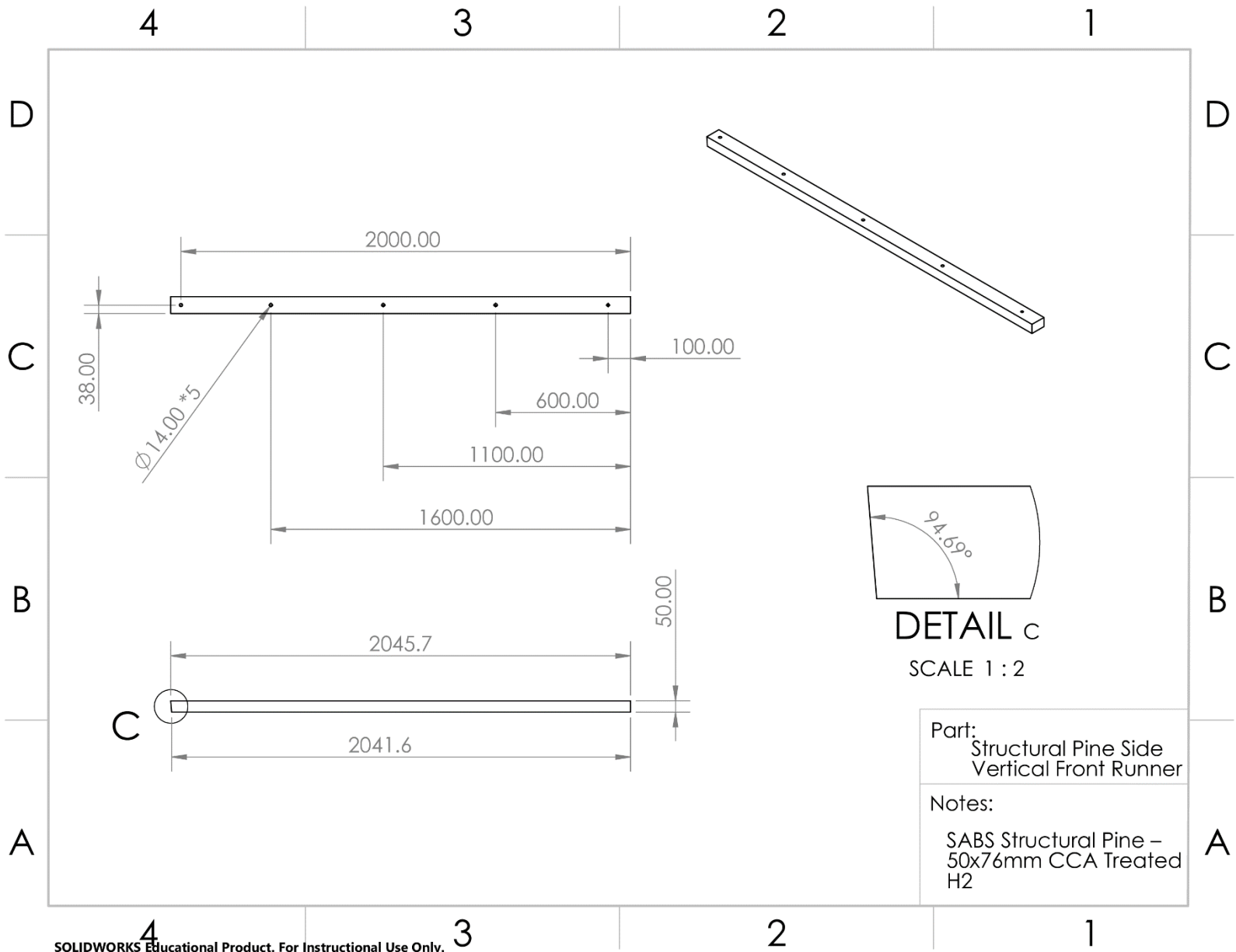


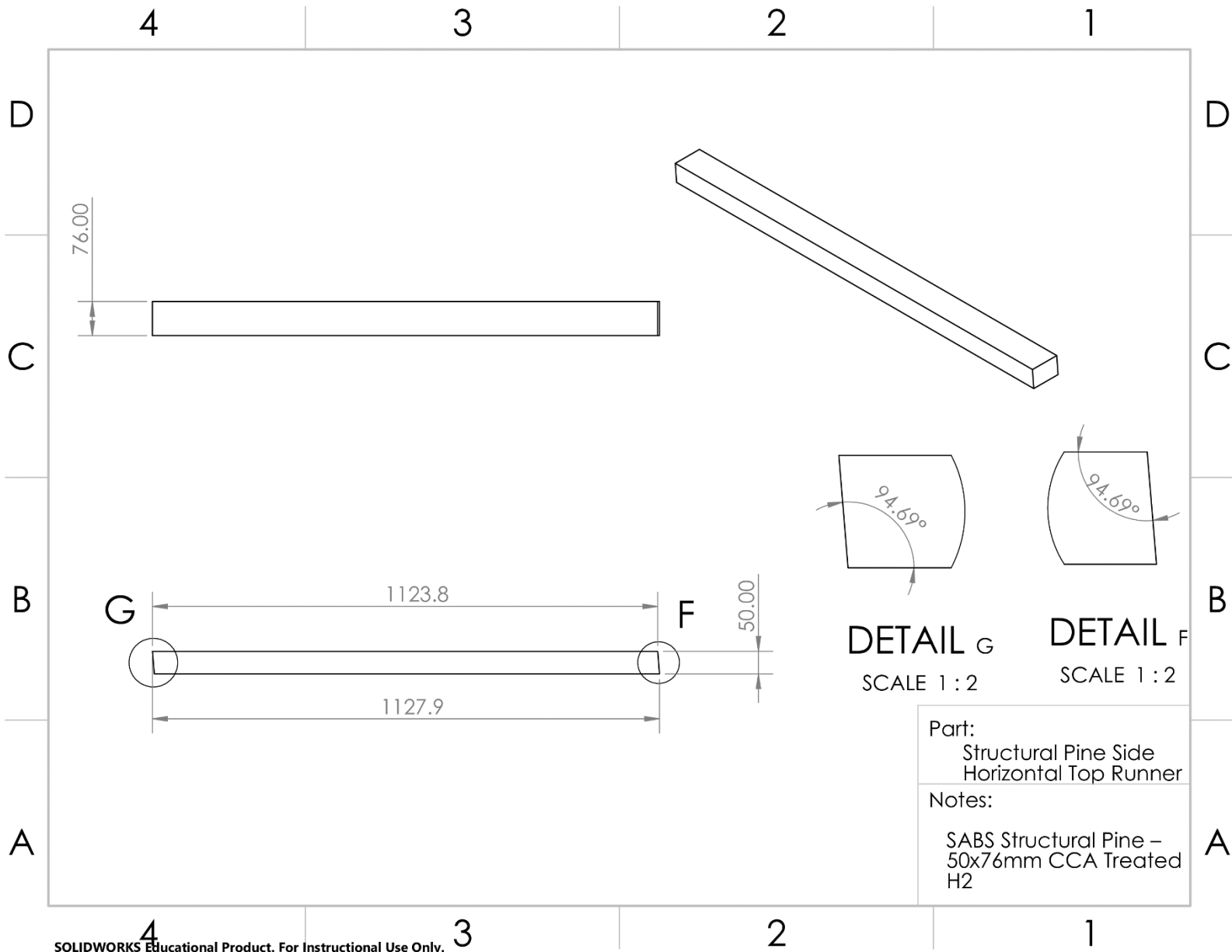


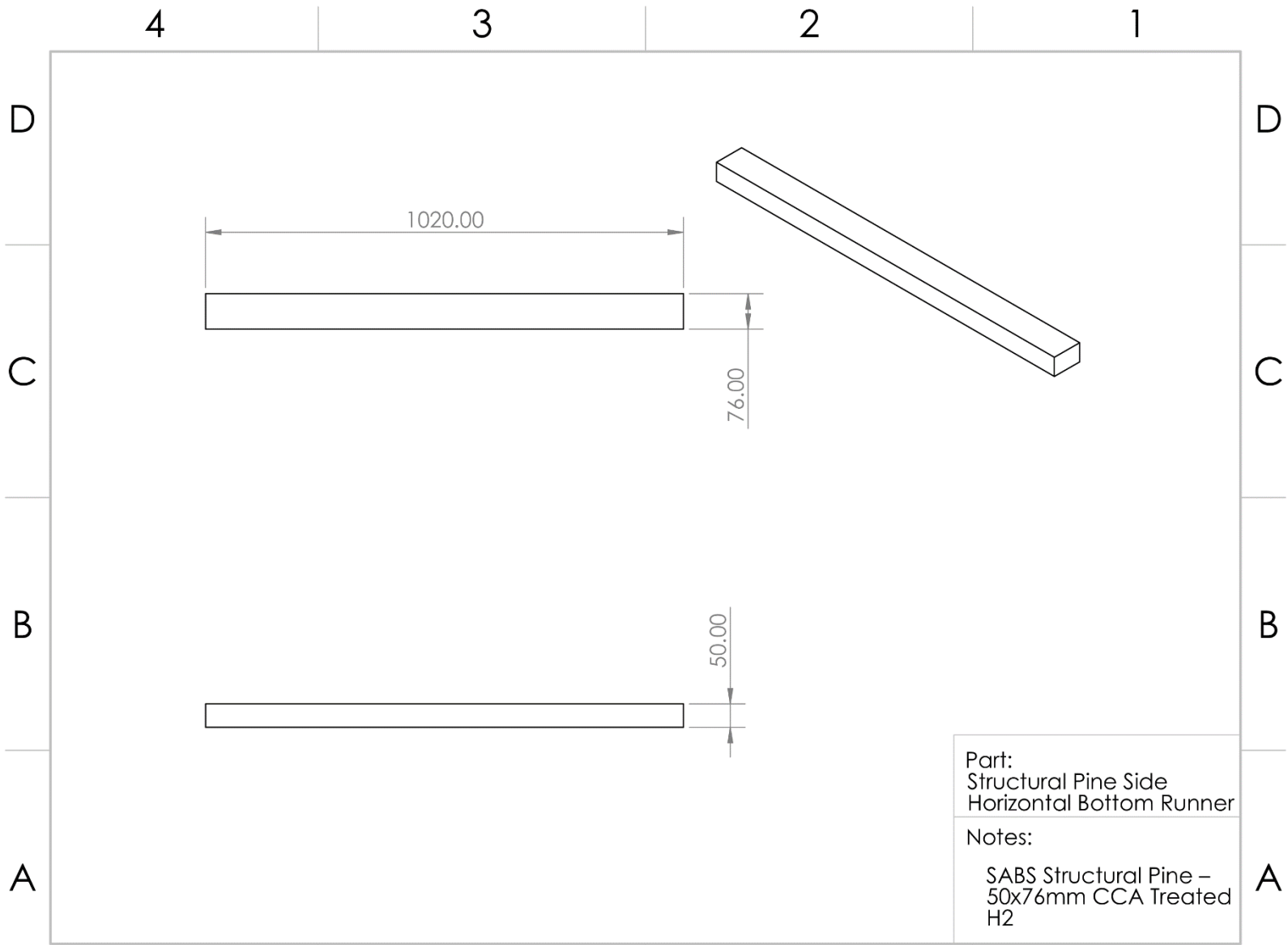
DETAIL B
SCALE 1 : 2

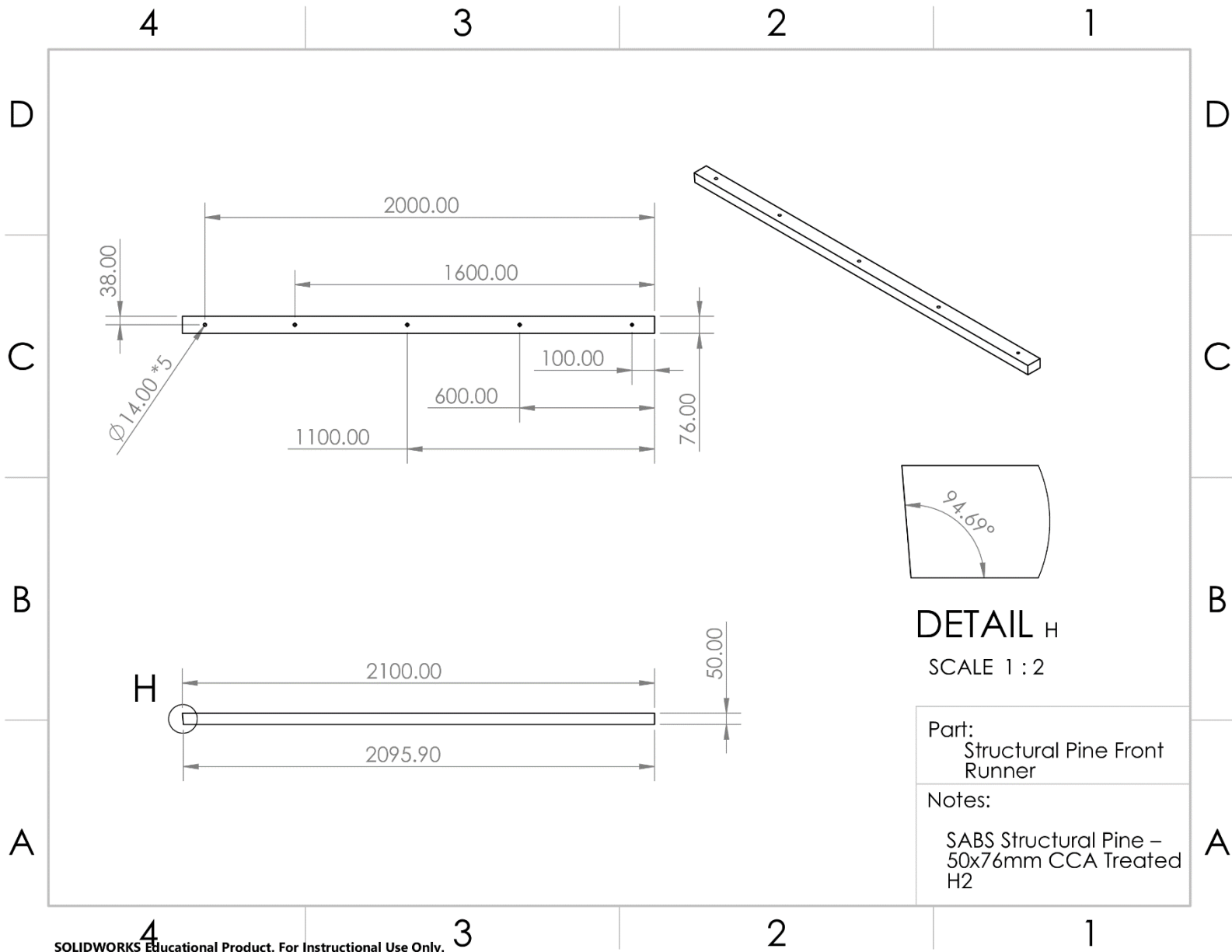
Part:
Structural Pine Side
Vertical Rear Runner

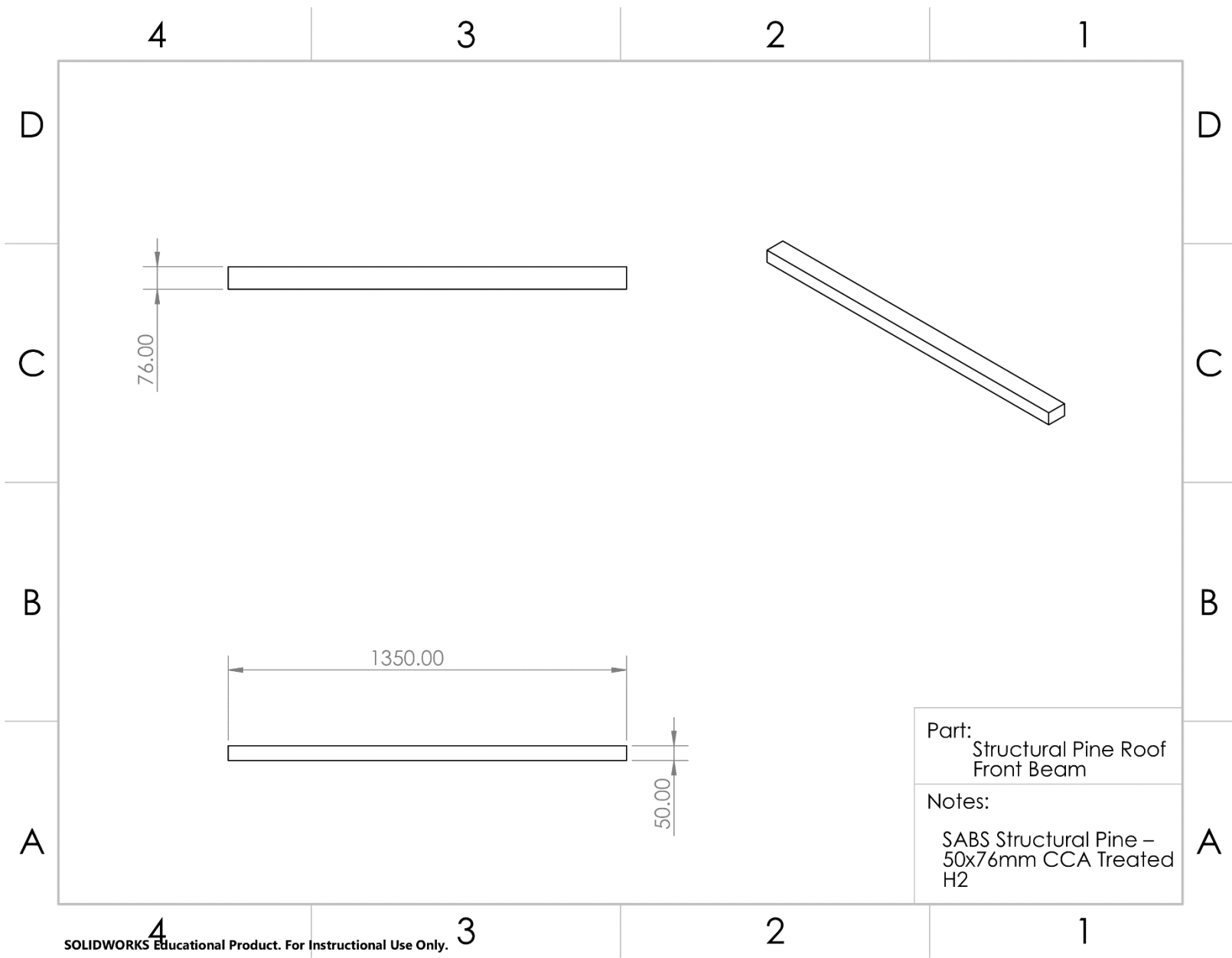
Notes:
SABS Structural Pine –
50x76mm CCA Treated
H2

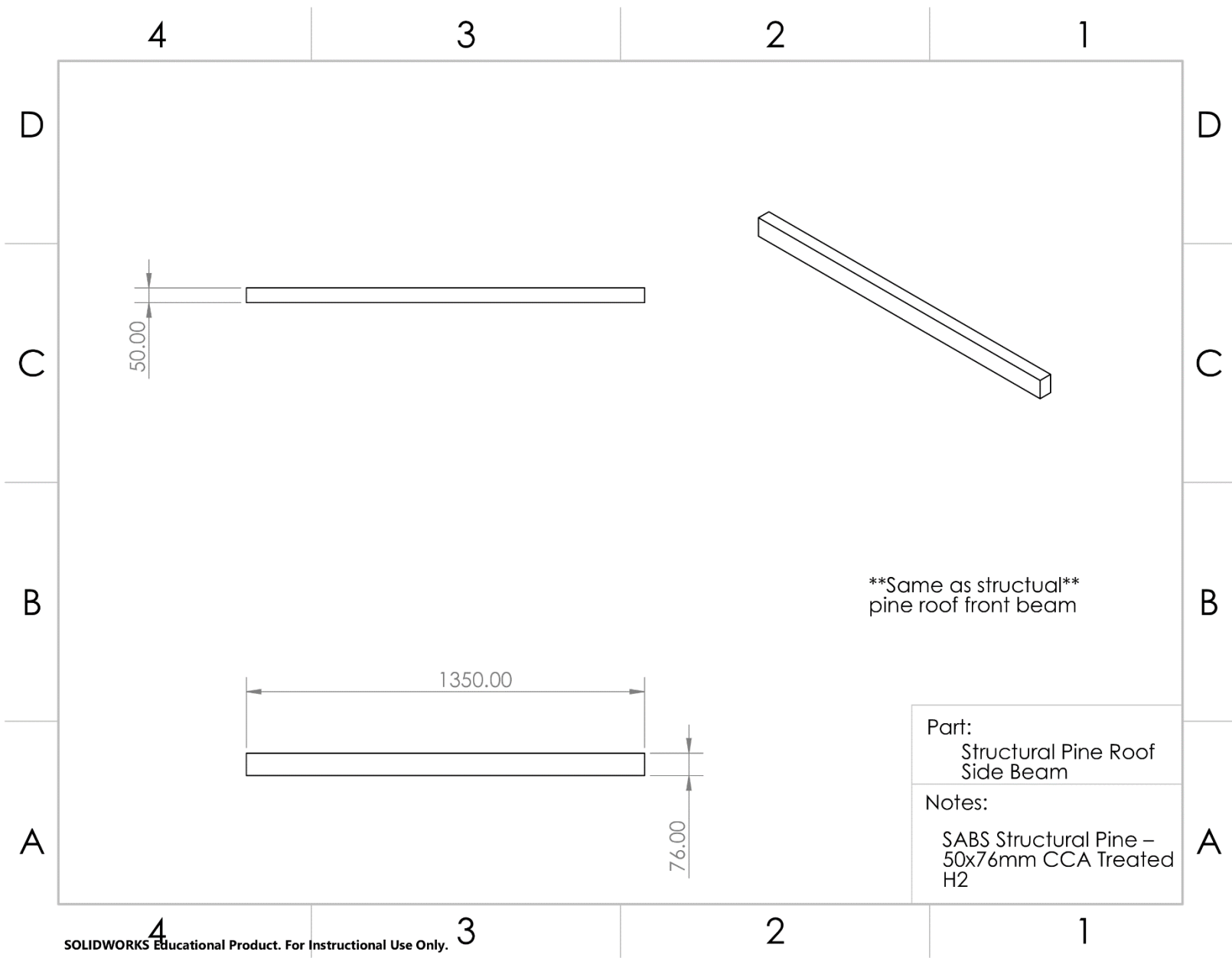


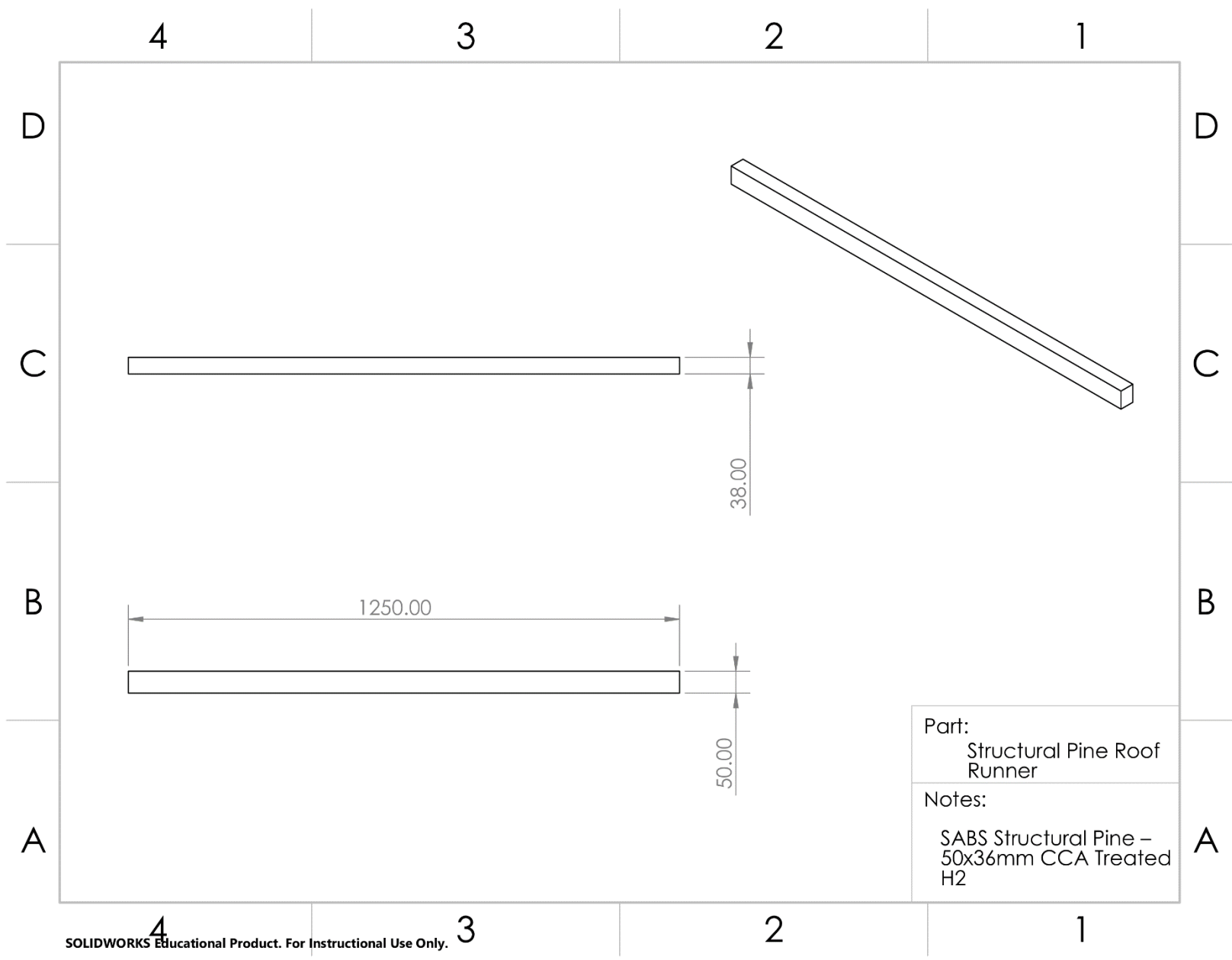






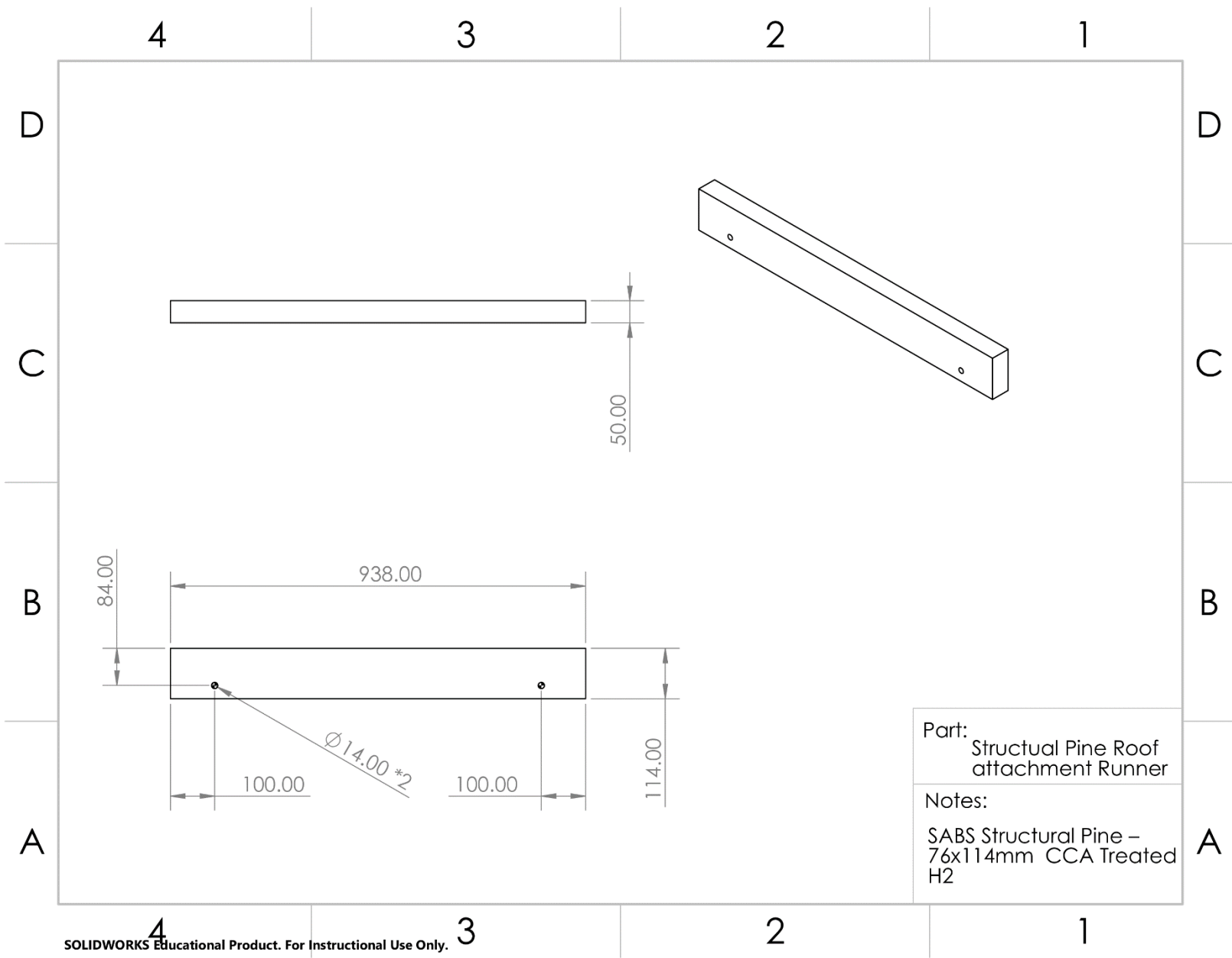


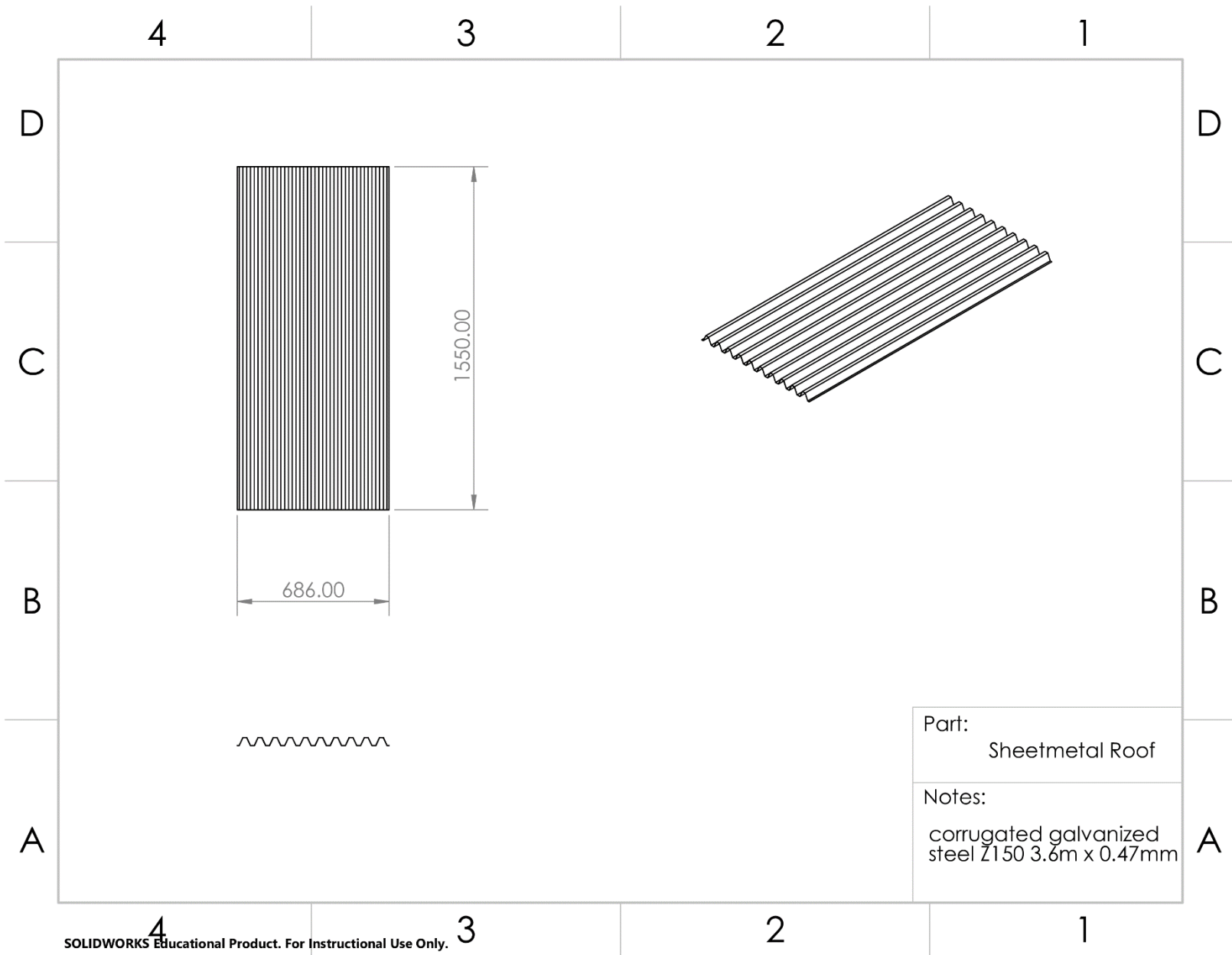




Part:
 Structural Pine Roof
 Runner

Notes:
 SABS Structural Pine –
 50x36mm CCA Treated
 H2





INTERIOR/CONTENTS OF THE BOOTHS:

Overall, the exhibit should consist of three main booths, each with a different story. Each story should highlight a different childhood experience of growing up in South Africa. The choice of what stories should be included and the development of how they should be presented will be a process beyond our project's reach, but in order to address the message of celebrating diverse childhood experiences, it is important that they cover as broad a range as possible.

The interior of each exhibit will contain a multi-faceted, sensory experience. Before entering the booth, the visitor will press a button, starting the chosen audio recording which will play throughout their visit. There are two main options for the audio component of the exhibit. The visitor could either listen to a recording of the room subject's story (similar to the story room) or they could listen to background noise and music that fits with the theme and time period of the story. Either way, the recording will enhance the visit by adding an additional sensory component and further immersing the visitor into the story being told. Upon walking into the booth, the first thing the visitor will see (on the wall opposite the door) is an image of the room's subject. This will take up a large portion of the center of the wall and will be the focal point for someone first entering the room. Surrounding this image will be a collage of other images from the subject's childhood or images that reflect their experience. These images can be collected directly from the subject and other members of their community. The collage wall will also contain short pieces of text or quotes to complement the imagery. Each of the two side walls will add to the story. One wall will show the story's setting, most likely by depicting the neighborhood the subject grew up in, or one similar to their own. This imagery might consist of a combination of drawings/cartoons (similar to the District Six room walls), real images, and text. The opposite wall will consist of a few more themes. Firstly, to provide context to the story, the exhibit wall should include background on geographic and historic information that might be important in understanding the subject's point of view. On this wall, it would also be useful to incorporate more specific information and facts about the person, such as their childhood favorite games, meals, music, etc., so the visitor can understand some of the ways they might be similar or different than the person who the room is about.

The final element to the booths will be the inclusion of prompting questions. This is an important aspect of all the current rooms at the museum that should be included in the mobile exhibit as well. The questions can be incorporated throughout all three main walls. They should prompt visitors to think deeply about the stories they are experiencing and aid them in developing a deeper understanding of the importance of diverse experiences. It is also important that they provide the opportunity for conversation, especially between adults and children. Some sample questions include the following:

- How can you relate to [name of subject]?
- How do you feel about [name of subject] story?

While the questions should not be so deep so as to confuse younger visitors, they should be thought provoking enough to spark interest and understanding in all who experience the exhibit.

INTERACTIVE ELEMENT:

The fourth booth will be almost structurally identical to the other three, but the content will be different. It will house an interactive activity which allows visitors to connect the stories of the other three booths with their own story. After walking through the first three booths, the visitors would enter the fourth booth, in which they would have the opportunity to tell their own

story. Instead of a picture of the room's subject on the wall opposite the door, there will be a mirror and a message reading "*Tell Your Story*". Across the rest of the wall will be prompting questions that appeal to a range of ages and address themes from each of the previous booths. These questions are different from the questions contained within the three other booths. The first three booths have questions that ask the visitor to think critically about the stories being told, whereas the fourth booth asks them to think critically about their own story. Some sample questions include:

- What is your favorite game to play?
- What does your home look like?
- *Specific questions based on presented stories.*

One of the side walls will contain a small table or desk with paper, markers, pencils, and other arts and craft supplies. The rest of the blank walls would be filled with clotheslines and clothespins, on which visitors would be able to leave their responses. The visitors would be able to enter the room, think about the questions, draw or write their own response, and either take their response with them or hang it on the wall for other visitors to see in the future. A similar type of "leave-your-mark" activity was successfully used by the United States Holocaust Memorial Museum in their traveling exhibit, *Fighting the Fires of Hate: America and the Nazi Book Burnings* (Badger & Harker, 2016).

Though the fourth booth would be an ideal situation for the interactive element, restraints on time, size, and finances might make it less feasible. Another option for increasing interaction with the exhibit would be to have a table outside the three story booths. This would still allow for visitors to have the opportunity to draw or write their own story without the cost of building and transporting an entire fourth booth. While this option is more cost effective, it loses the sense of cohesion and fluidity that the fourth booth would bring to the exhibit.

RECOMMENDATIONS ON NEXT STEPS

Based on our findings and the status of the deliverable, we recommend that the following actions be taken to contribute towards the development of the mobile exhibit:

- *Secure funding to support the development and construction of the story booths.* Included in the exhibit description and construction guide is a cost estimate for build materials, but additional costs will include hiring a contractor to follow through with the design process as well as hiring a graphic designer to put together the designs for the interior walls.
- *Determine whose childhood stories will be told in each booth.* This will involve identifying potential story themes, identifying subjects within the community willing to share their stories, performing interviews with each subject, and narrowing down the participant pool to contain a small number of diverse stories.
- *Collect the multimedia elements to support each story.* This will include finding photographs from the subject's childhood (or from people with similar childhood experiences), creating audio recordings of the subject's story, developing graphics to accompany the stories, and collecting the supporting background information to provide sufficient historical and geographic context to the story.
- *Contact and hire contractors and graphic designers to carry out the construction and interior design of the booths.* The blueprints provided within the construction guide should allow for a seamless transition of ideas.

If funding cannot be secured within a reasonable timeframe, it is also possible to create a pilot exhibit which utilizes the overall message and exhibit structure outlined in the exhibit

description and construction guide. A similar experience to what the booth offers can be achieved through less expensive means if the interior of the booths is displayed as large posters. The “Tell Your Story” activity could then be located at a table at the center of these posters, keeping the interactive element intact. In this iteration, the exhibit loses the sense of complete immersion into the life of another, but still allows for the visitor to learn about and picture the lives of those whose childhood experiences differ from theirs.

There is also an opportunity for long term expansion of this exhibit, given it is determined to be a useful resource for the museum after its implementation. The current model for the exhibit calls for three storytelling booths. If the museum decides that the project has been successful though, the exhibit could easily be expanded to contain more booths, and therefore more examples of diverse childhood stories.