

THERAPLAY

EVIDENCE BASED DESIGN

KELSEY PARK | BALL STATE UNIVERSITY | IDES 424 | FALL 2021



BACKGROUND

TherAplay is an Occupational and Physical Therapy center for children with limited function and mobility. They specialize in hippotherapy as a practice. Hippotherapy is a physical, occupational, and speech therapy that utilizes the movement of a horse to provide motor, and sensory input. It is used for patients with physical and mental disorders.

RENOVATION TAKE-AWAYS (CURRENT)

From previous stages of this project with TherAplay, many conclusions and decisions have been made.

The client, TherAplay, wants a very **natural interior environment** that reflects the calm attributes of the outdoors. The natural elements will be rustic, not polished. The spaces are not to look like a polished cabin and should be very **inclusive and comforting** to the people occupying the space.

Surveys were conducted to determine what the client wants in the space. The take-aways from these surveys are summarized below: Exposed physical elements are desired to bring character into the space and add pleasing details and positive distractions while observing the interior space. **Privacy** from personal areas is also important, but maintain the integrity of **natural and barn-like features**.

Organization is important and separate areas between files, books, **storage**, and desks is essential for cleanliness. Having areas to store important materials separate from work spaces helps keep items organized, secure, and private.

Interior windows to connect appropriate rooms is desired for **increased visibility and connectivity**. Open spaces with flexibility in purpose and function is also a consideration. **Windows and natural light** are favored over artificial lighting.

Open concept and open spaces, allowing for personal space between families, is desired heavily. This will help with conversing with people and not increasing volume levels as well as **avoiding overcrowding** and inappropriate distractions for the children attending TherAplay.



Natural elements with **contrast** is also important for the children so that the space is visually pleasing and clear. The **contrast of colors in materials** and items will help them compartmentalize elements in the space around them.

RESEARCH

SENSORY INTEGRATION: MATERIALS, COLOR, AND FURNITURE

Sensory Integration with Cerebral Palsy: Cerebral palsy results in abnormal degree of sensory processing (increased or decreased). Over sensitive and under sensitive feelings can lead to mental and physical distractions or fatigue.



Sensory integration helps children use their senses appropriately and self-regulate. Example: Lack of sensitivity to touch can result in inaccurate perceptions of weight and texture.



- Different levels of sensory:
- 1) Over responsive = avoidance, cautious and fearful
 - 2) Under responsive = withdrawn, passive or difficult to engage
 - 3) Sensory seeking = impulsive and take risks

Sensory Integration works to improve different senses by:

1. VISION

- neon, patterned, and florescent paper
- colored lights, holiday lights
- wind-up toys

Colors should be introduced for strengthening vision with contrasting colors. Overall muted tones are preferred with pops of color through furniture or patterns to provide a focal point and place of interest for the children to focus on.

2. HEARING

- water trickling
- music (chimes)
- repetition

3. TOUCH

- hard = rocks, floors, counters
- soft = fur and feathers
- surfaces = sticky, rough, pointy, and smooth

4. MOBILITY

- throwing a ball
- bouncing on a ball
- swinging
- sliding

Mobility in furniture is important, whether the furniture piece moves or the piece requires the individual to move. Swings, exercise balls, walkways, and stairs are beneficial to improve the individual's mobility.

TAKE-AWAY

It is important to incorporate a variety of materials and activities that challenge the five sense. Introducing new feelings, sounds, and subtle visual changes is important to help balance out the levels of sensitivity. Providing ways for childrent to see light and colors differently (by their control) is a great way for them to gradually de-sensitize their sense to what could be troubling to their learning.

RESEARCH

LIGHTING EFFECTS WITH AUTISM:

LIGHTING AND COLOR

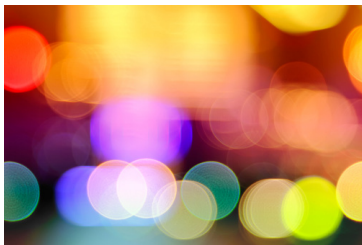
Lighting Effects with Autism:

Lights with mellow colors (like blue) can help kids relax and become creative. Harsh and flickering lights can confuse and harm them. Natural light is also extremely important to help regulate their circadian rhythm.

Therapy Purposes:

- Lights with 10,000 lux and emit no UV light are optimal.
- Best to do light therapy in the morning as they are just waking up.

Do not use fluorescent lights!



Light is made up of electromagnetic waves and each hue interacts with neuropathways in the brain.

Colors affect mood, behaviors and performance.

Studies decoding the physiological effects of different hues have shown changes in sensory sensitivity, blood pressure, heart rate, and brain development.

Colors like red, orange and yellow provide

a high level of stimulus and increase energy and encourage creativity. This is good for kids with autism.

Green helps to relax the nervous system and lessens feelings of stress. It seems to help with communication and developing speech skills. Cool tones may be a good choice for individuals where reducing stimulation is a high priority, such as those with ADHD or the hypersensitive variation of Autism.

TAKE-AWAY

Light therapy is extremely beneficial to children with autism specifically. Lights can generate a specific emotion or mood based on the color and intensity. Natural light is most effective and beneficial, so mimicking natural light through artificial light is most comfortable in an indoor space. Allowing people with autism to adapt to lights of different colors and brightnesses is helpful, as long as fluorescent lights are avoided since those types of lights often increase anxiety and stress.

(Kimble, 2020.)

("How Light Can Help Autistic Children." 2020.)

DESIGNING A SPACE FOR SOMEONE WITH AUTISM: ACOUSTICS AND WAYFINDING

Designing a Space for Someone with Autism: Often times, simplicity is better.

Design factors to heavily consider:

- 1) Acoustics:
 - provide better sound insulation to minimize distraction and disturbances.
- 2) Lighting:
 - small areas of bright colors.
 - larger areas of light unsaturated earth tones.
- 3) Spatial Reasoning:
 - organization.
 - storage to minimize clutter and distractions.
 - wayfinding through repetition.

RESEARCH



Colors used throughout the apartment were chosen to promote calmness and relaxation. The selected colors were blue, grey, green, tan, and lavender.

The design team also carefully included a repeated material palette strategically throughout all spaces to increase familiarity and comfort in public and private rooms. Subtle colored visual paths were used to help with wayfinding.



Natural elements are beneficial as well, promoting calmness and a sense of familiarity and grounding. Designing a floral wall and including foliage throughout spaces stimulates health and well-being. Natural materials in terms of fabrics, paints, and other specifications are often chemical free and have low toxicity levels.

TAKE-AWAY

Acoustics are important to minimize distractions from outside areas and decrease pain or confusion. Buffering out harsh noises from outside will help keep children with autism focused.

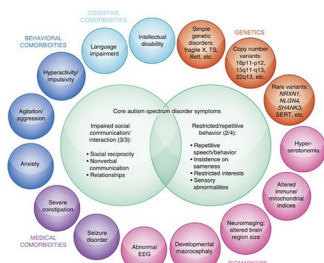
Wayfinding can be done in a way where color is repeated in an organized way to help them follow a trend or path through the space. Color categorizing areas is effective for this. Organization is important to also help minimize stress and distractions.

(“Four Keys to Designing Autistic Friendly Spaces.” 2020.)

CASE STUDY

DESIGNING FOR THE AUTISTIC: FIRST PLACE APARTMENTS, ARIZONA

The First Place Apartments are apartments that were designed in Arizona to help adults with autism move to live more independently into a specially designed apartment complex. The design of the apartments was curated for people with autism, so that they may comfortably use the space. Many elements were implemented to make sure the design would not be disturbing, distracting, or overwhelming.



TAKE-AWAY

Natural tones are relaxing and soothing, offering familiarity to what is outside. Colors are chosen to create a feeling of calmness and relaxation. Repeating colors and patterns in different rooms makes the spaces feel familiar and inviting. Subtle colored visual paths help with wayfinding throughout the space in addition to the repetitive patterns. Natural materials and elements help clean the space and promote well-being.

(Denhardt, 2017.)

OBSERVATION NOTES

THERAPLAY IN-PERSON

OBSERVATIONS

To understand what is needed for the children, and what would be most beneficial for their therapy, three visits were arranged to TherAplay in Carmel, IN.

The first visit was a tour of the facility, the new renovation, and the areas that our focus will be in (new gym and the arena).

Take-aways from first visit/tour:

- Children learn daily skills
- Practice physical therapy and occupational therapy
- Colors, materials, and other sensory related design elements must be carefully considered

The second visit was for a personal observation, and observing the behavior of the children in the arena (hippotherapy) and in the gym. This observation helped understand common behaviors of the children and to better understand what types of activities they do and practice while at TherAplay.

Take-aways from first observation:

- Practice fine motor skills and daily routines
- Muted colors make them calmer and less distracted
- Noise can be distracting

The third visit was for another observation, but this observation focused on furniture pieces and equipment used by the children. We observed the use and functions of a specific piece of equipment in the gym area.

Take-aways from second observation:

- Enjoy fun designs and colors
- Most common activities include life skills
- Practice their independence
- Enjoy games

DISCUSSION WITH THERAPLAY EMPLOYEE

While at TherAplay, some main 'needs' in terms of equipment pieces, furniture, and activities for the children were provided to us by a TherAplay employee.

She mentioned that activities along the wall of the arena for the children to interact with while they rode horses would be beneficial.

Some ideas based off this were:

- Mail boxes
- Cork board / Magnetic board
- Peg board

Moving into the gym area, she mentioned some pieces that would be beneficial to the children to practice in there that would transfer to real-life skills.

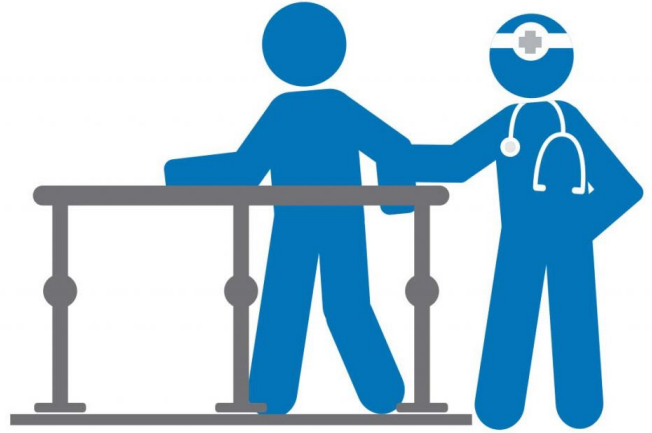
Some ideas based off this were:

- Sensory wall
- Swing
- Stairs
- Balance Chair

After considering the needs and possibilities for what to create to be in TherAplay, I decided to combine a few ideas into one... I plan to create a stair piece that also has a small sensory wall at the top.

This will be able to practice both physical therapy in the act of walking up steps, and work on fine motor skills and sensory adaptation with elements on the sensory wall.

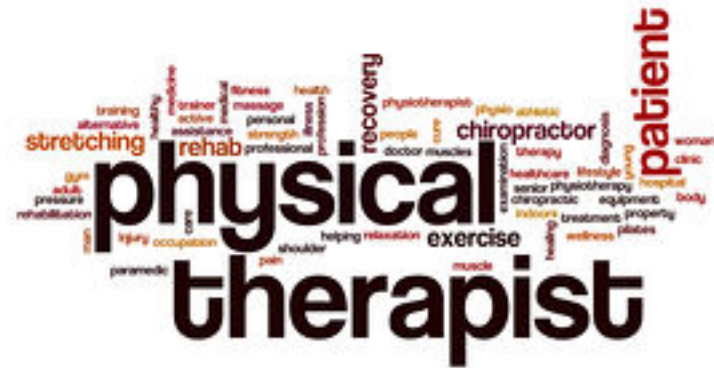
CONCEPT



To achieve the needs of the clients, the concept behind my design is to create a dynamic piece that meets both the needs of physical therapy and sensory adaptations.

Combining the elements of a physical therapy piece that practices muscle control and mobility, with a piece that also contributes to sensory integration.

To achieve both of these elements and goals in a furniture piece, I decided to use a stair piece for the physical therapy piece to integrate the concept of children walking up and down stairs independently, assisted by a hand rail or therapist. This is an important skill since stairs are encountered often throughout daily life. Then, to integrate an element of sensory, I will incorporate a sensory wall and activities of some kind that will be attached or built into the stair case.



DESIGN IDEAS

CLIENT NEEDS / WANTS

- Furniture Piece
- Elements that promote daily exercises
- Peg board wall in arena
- Activities for fine motor skills
- Safety considerations

FURNITURE IDEA

Combine the designs of a play stair set, with the option of storage, as well as an interactive wall/side.

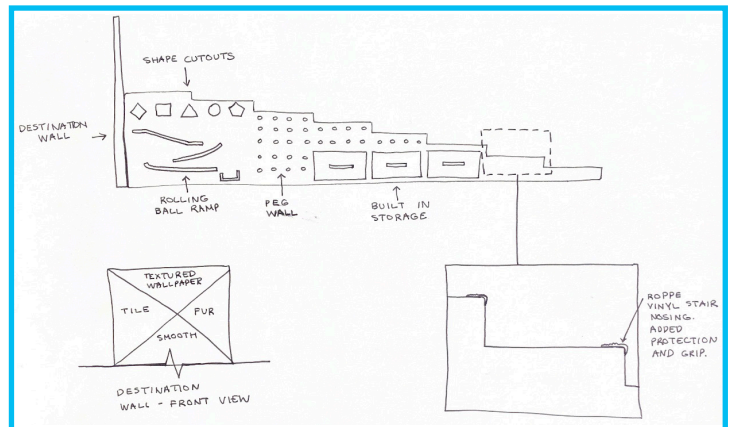
The stairs would provide a physical obstacle for kids to practice muscle control on. The option of have storage offers organization and cleanliness to the space without taking up other purposeful space in the room. An interactive side/wall would allow the stairs to have functions for physical and mental/cognitive practices. Shapes, pegs, and lights of different kinds could be combined into the element for an interactive station.

The addition of adding elements of different materials; fur, feathers, leather, wood; will help with feeling and touch as well.



The piece itself is focused on physical therapy by having children walk up steps using their muscles to balance and step up. Walking up and down stairs is a life-skill, something that TherAplay wants to focus on strengthening in each child!

PRELIMINARY SKETCHES



BASIC STRUCTURE

The steps have been shortened to be less height per step. This is to help the kids really be able to do the stairs on their own without much need of assistance.

This is good practice for their mobility on steps and balancing as they move upwards.

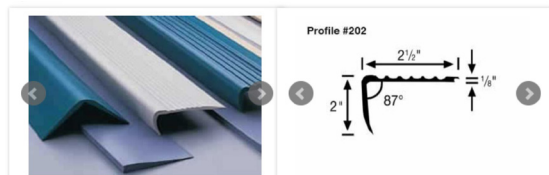


INTERACTIVE WALL EXAMPLES

These photos demonstrate interactive items that would work on fine motor skills and cognitive practices.

Incorporating elements of color and shape will promote visual learning while the movement of pieces throughout the interactive wall will help with fine motor skills.

Roppe Vinyl Stair nosing would add protection to the stair corners, making them less dangerous as children travel up the steps.



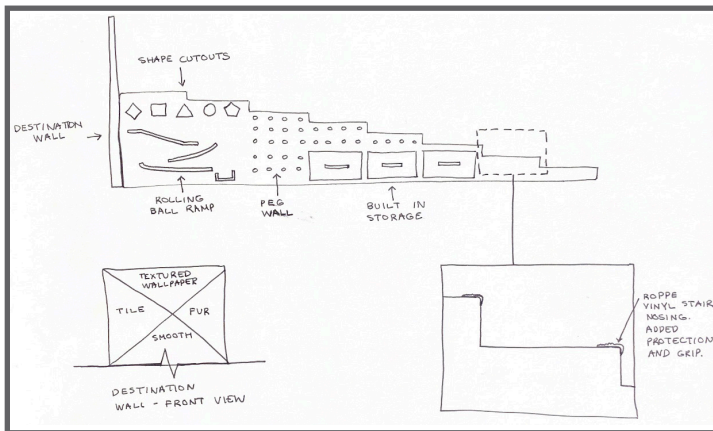
DESIGN IDEAS

The end destination of the stairs is a texture wall, incorporating different types of materials for the children to feel.

The different materials would introduce them soft, hard, smooth, and course surfaces. This is important so they have a sense of touch and feeling.



THERAPIST'S FEEDBACK



The therapist for TherAplay will approve all ideas and provide suggestions based on knowledge of what is important and essential for the children.

Jessica Boram, the therapist, received my initial ideas and preliminary sketches for the furniture piece [as seen above].

Her feedback is crucial to moving forward as certain standards may be different when installing pieces for kids with disabilities.

FEEDBACK EMAIL:

Hi Kelsey!

I love the stair option with storage solution! The stairs will be placed up against the wall so we will only have access to one side and we would need railing on the side with the storage for safety. Ideally the left side of the stairs will be placed up against the wall. The ceiling height is also limited to 8 feet, so we will need to take that into consideration when planning the final height of the top platform. The steps will also need to be standard ADA height and depth to complete standardized testing. Thank you so much for your hard work!

Thank you,

Jessica Boram PT, DPT

Physical Therapist

9919 Towne Road, Carmel, IN 46032

Main office (317) 872-4166

www.childrenstheraplay.org

TAKE-AWAY

Moving forward with the design development, consider and add the following:

-Railing on the outside edge of the stairs for support

-Leave minimum of 5'-0" of space from the top of the platform to the ceiling of 8'-0"; making the platform no more than 3'-0" in height

-Steps will need to be standard ADA height and depth to complete standardized testing

REFINED DESIGN

FURTHER RESEARCH

Taking in to consideration the feedback of the therapist, it is important to apply ADA standards required for this furniture piece.

STEPS:

The ADA standard for a stair depth, or tread, is minimum of 11 inches.

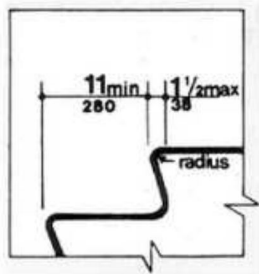


Figure 18a

Usable Tread Width and Examples of Acceptable Nosings - Flush Riser

The riser height standard is minimum of 4 inches and maximum of 7 inches.

HANDRAILS:

Handrails are to be continuous along the steps. There shall be a 12 inch minimum extension at the bottom and top of the stairs.

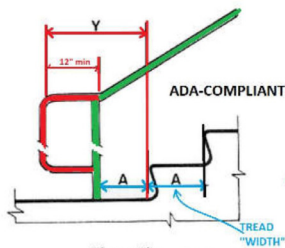
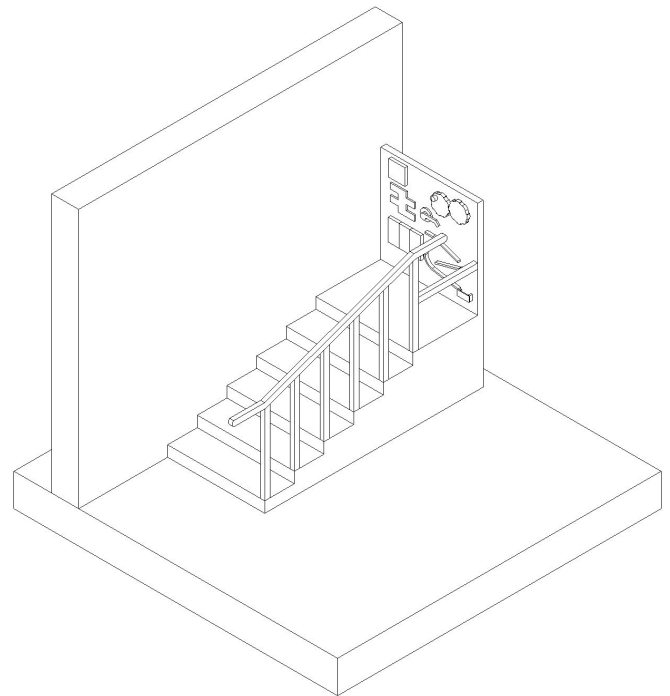


Figure 19c
Stair Handrails - Extension at Bottom of Run

Handrails are also required to be 31.5 inches above the stair nosing when applied to one side.

Per my design, it will be placed up against a wall, so only one handrail is required on the exterior side of the stairs.

These standardized dimensions will be applied to the required dimension to not have the top platform higher than 3'-0" in the space.



Shown above is a 3D depiction of the piece done in Revit, with the added elements requested by the therapist. This 3D model does accurately depict the size next to the 8'-0" wall. The stair width is the standard 36 inches. Since the sensory wall was placed as the 'goal' and destination at the top of the stairs.

Storage drawers will help hold other activities and equipment, and help children with their skills to open and close the drawers.

The option to make the stair piece three separate pieces that can be put together for easy transportation are ideal. The piece would be divided as the stairs, the platform, and the sensory wall.

The railing would be able to be inserted into the stairs with slots where they would fit.

DESIGN DETAILS

FURTHER RESEARCH

Now that the stair piece has been developed into a rough model and depicted into shape, size, and design elements, design details can be specified.

MATERIALS:

The stair case will be made entirely out of Spruce Wood, unless noted otherwise.

The sensory wall will include elements such as: fur, brick texture, sparkle texture, metal, mirror, and wood. The sensory wall will also contain colors such as blue, purple, green, and muted red. These colors will be able to capture the children's attention, focus, and interest without being overwhelming.

JOINTS AND CONNECTIONS:

The piece will be connected through nails, screws, and nail glue for permanent connections.

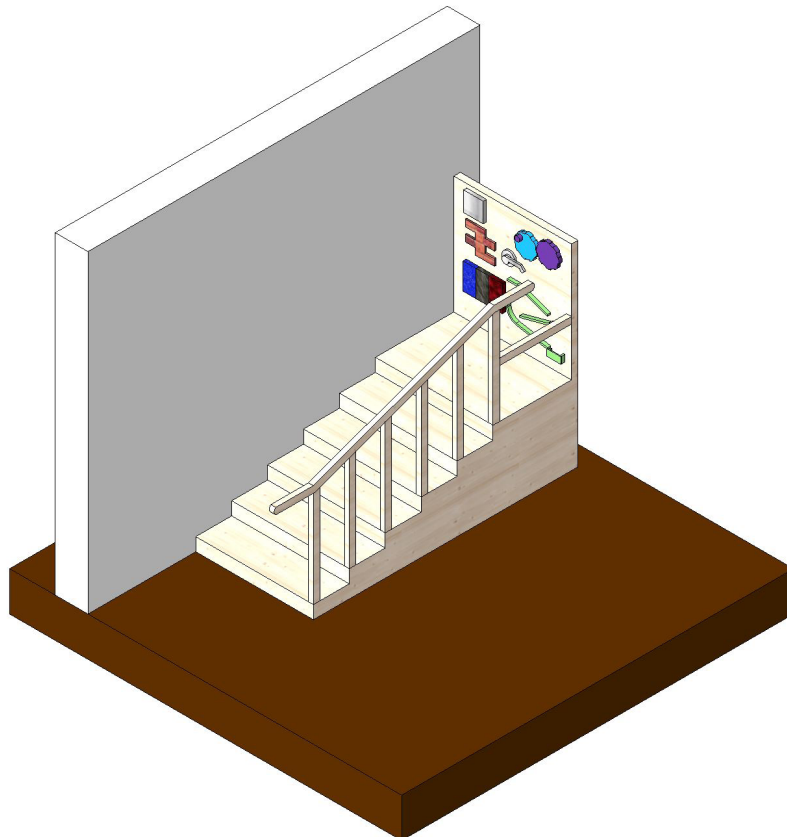
For areas of connection that can be taken apart during transportation, pegs and holes will be used for sliding and locking into place.

All these details are explained and depicted clearly in the Construction Documents for this furniture piece.

A material realistic image of the furniture piece is shown below.

Following this page are the set of Construction Documents for the building of the stair piece and sensory wall.

The construction documents provide information to build the piece of furniture as well as a realistic rendering of what the piece would look like in a space with 8'-0" ceilings, same as the gym at TherAplay.



SENSORY STAIR FURNITURE PIECE



1 REALISTIC RENDERING

GENERIC FURNITURE PIECE NOTES:

IMAGE NOTES:
IN THE ABOVE 3D MODEL IMAGE, THE STAIR PIECE IS SHOWN PLACED UP AGAINST AN 8 FOOT WALL..

FURNITURE PIECE DETAILS:
THE PIECE IS TO BE CONSTRUCTED OUT OF SPRUCE WOOD OF 3/4 INCH THICKNESS, UNLESS NOTED OTHERWISE.
**NOT SHOWN IN THE 3D VIEW ARE THE CONNECTING ELEMENTS AND JOINTS BETWEEN DIFFERENT PIECES. ALL PIECES ARE CONNECTED BY EITHER SCREWS, NAILS, AND/OR NAIL GLUE.

THE PIECE IS CONSTRUCTED IN FOUR SEPARATE PIECES FOR EASE OF TAKING APART FOR TRANSPORTATION. THE PIECES ARE STAIRS, PLATFORM, SENSORY WALL, AND RAILING.THE VDs FOR EACH OF THESE PIECES ARE INCLUDED IN THAT ORDER.

SENSORY WALL DETAILS:
THE SENSORY WALL IS MADE UP OF SEVERAL ELEMENTS FOR FINE MOTOR SKILLS AND SENSORY FUNCTIONS.
SHOWN IN THIS PARTICULAR DESIGNS ARE ELEMENTS SUCH AS:

- MIRROR
- BRICK TEXTURE
- THREE VARIETY TEXTURE MATERIALS
- DOOR HANDLE
- COG WHEELS
- BALL RAMP

THE SENSOR WALL PIECES ARE DETAILED ON SHEET A103.

INDEX

- A101 - PIECE A, STAIR PIECE
- A102 - PIECE B, PLATFORM PIECE
- A103 - PIECE C, SENSORY WALL PIECE
- A104 - PIECE D, RAILING PIECE



THERAPLAY FURNITURE
PIECE PROJECT

CARMEL, IN

DESIGNING FURNITURE
FOR OCCUPATIONAL AND
PHYSICAL THERAPY
PURPOSES



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IMMERSIVE LEARNING
PROGRAM

DRAWN BY KELSEY PARK

COMPANY BALL STATE
UNIVERSITY
INTERIOR DESIGN
IDES 424
FALL 2020

CLIENT THERAPLAY

DATE

SCALE: 1/2" = 1'-0"

SHEET: G100

PIECE A: STAIR PIECE

THERAPLAY FURNITURE
PIECE PROJECT

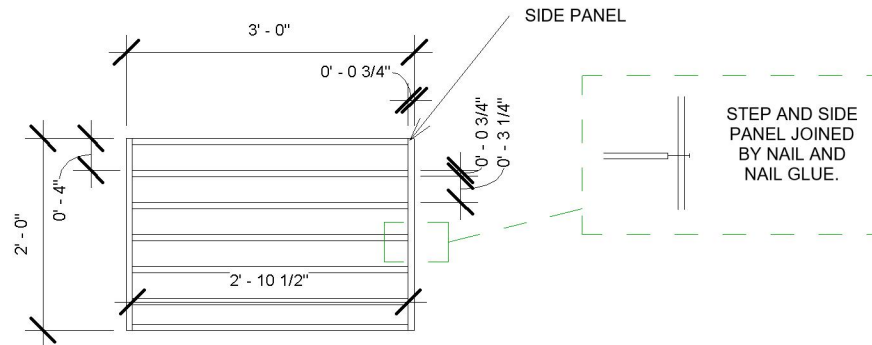
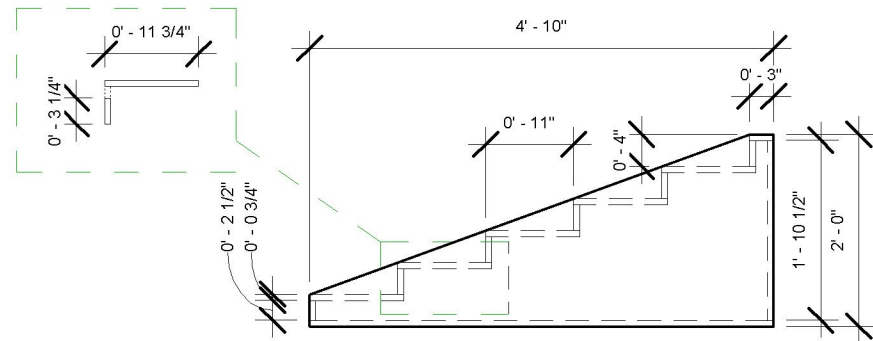
CARMEL, IN

DESIGNING FURNITURE
FOR OCCUPATIONAL AND
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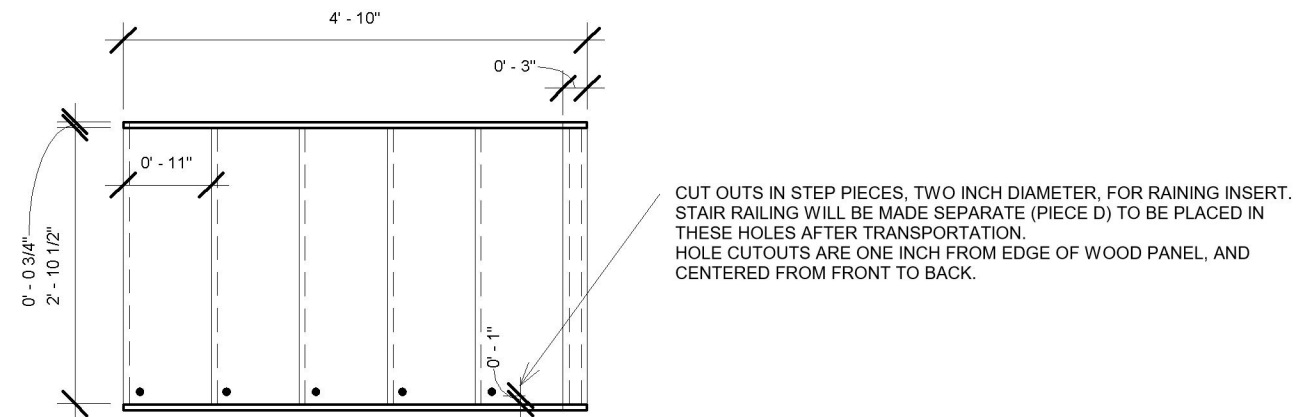
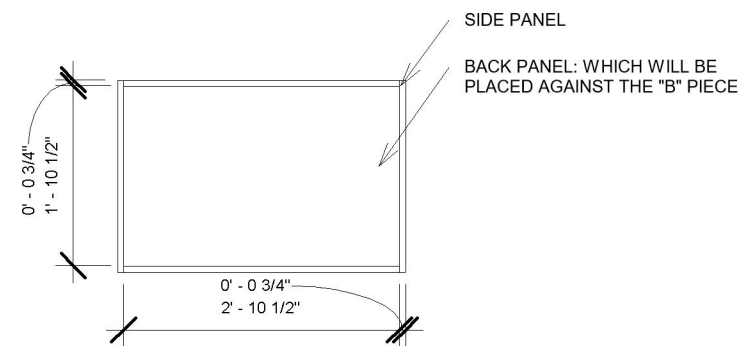
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1 SIDE VIEW

2 FRONT VIEW



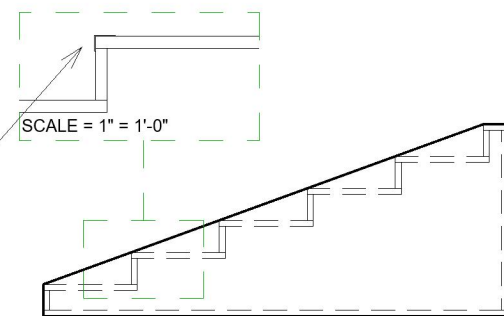
3 BACK VIEW

4 TOP VIEW

DETAILED STAIR NOTES:

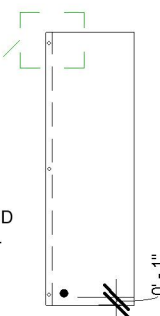
5A

ROPPE VINYL STAIR NOSING WILL BE PLACED ON EACH STEP CORNER FOR ADDED PROTECTION AND GRIP AS CHILDREN TRAVEL UP THE STEPS. SIX STRIPS OF ROPPE VINYL STAIR NOSING NEEDED.



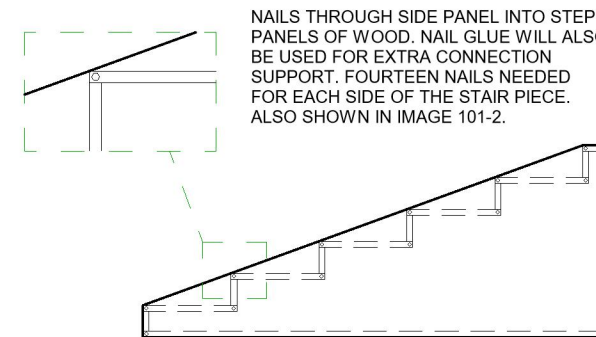
5B

STAIR PANELS CONNECTED THROUGH NAILS AND NAIL GLUE. ALSO NAILED AND GLUED TO SIDE PANELS FOR SUPPORT, AS SHOWN IN IMAGE A101-2. THREE NAILS SPACED ALONG EDGE OF BOARD.



5C

NAILS THROUGH SIDE PANEL INTO STEP PANELS OF WOOD. NAIL GLUE WILL ALSO BE USED FOR EXTRA CONNECTION SUPPORT. FOURTEEN NAILS NEEDED FOR EACH SIDE OF THE STAIR PIECE. ALSO SHOWN IN IMAGE 101-2.



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SCALE: 1/2" = 1'-0"

SHEET: A101

PIECE B: PLATFORM PIECE

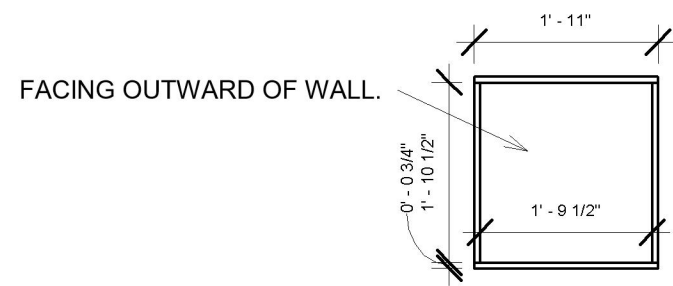
THERAPLAY FURNITURE
PIECE PROJECT

CARMEL, IN
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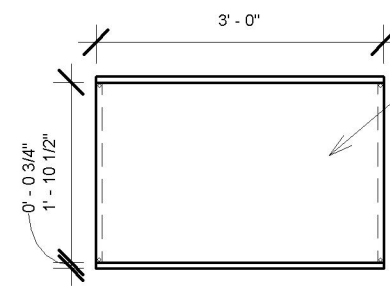


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1 SIDE VIEW

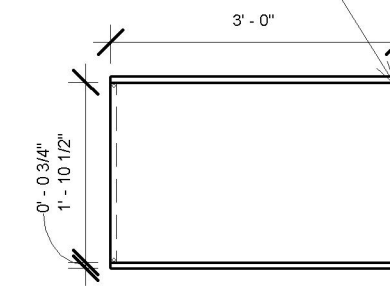


2 FRONT VIEW

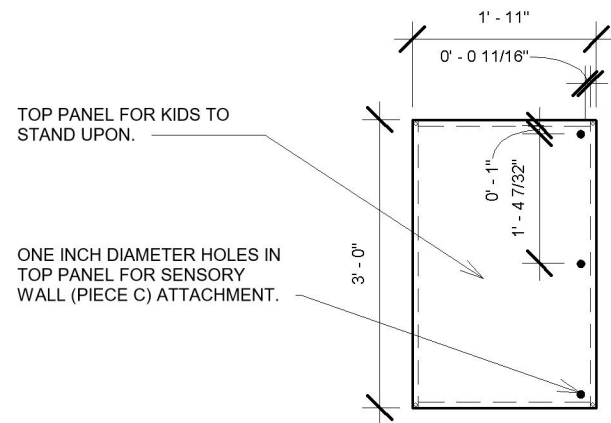
THIS SIDE WILL BE PLACED
AGAINST THE "A" PIECE.

FOUR NAILS USED ON
FRONT AND BACK SIDE,
CONNECTING THROUGH
TO SIDE PANELS.

NAIL PLACED THROUGH BACK
PANEL INTO SIDE PANELS.



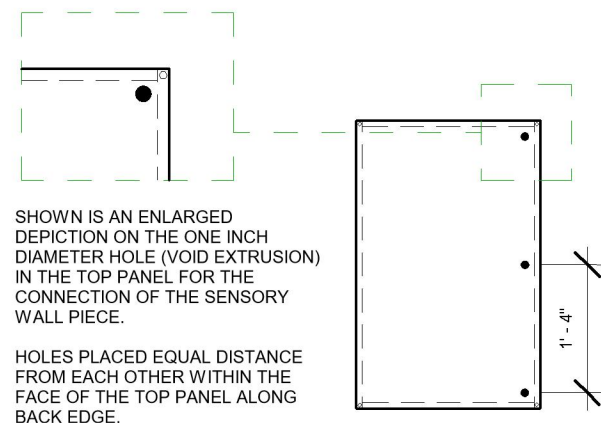
3 BACK VIEW



4 TOP VIEW

DETAILED PLATFORM NOTES:

5A

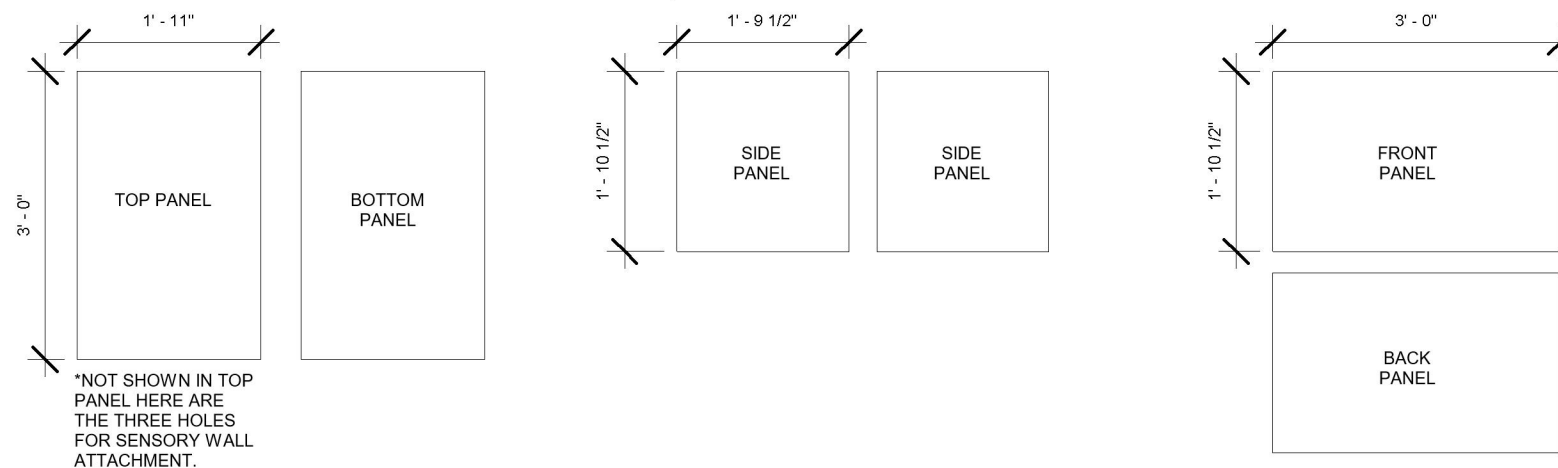


SHOWN IS AN ENLARGED
DEPICTION ON THE ONE INCH
DIAMETER HOLE (VOID EXTRUSION)
IN THE TOP PANEL FOR THE
CONNECTION OF THE SENSORY
WALL PIECE.

HOLES PLACED EQUAL DISTANCE
FROM EACH OTHER WITHIN THE
FACE OF THE TOP PANEL ALONG
BACK EDGE.

5B

NOTE:
ALL 'SIDE' FRAME PIECES ARE A HEIGHT OF 1'-10 1/2". THE REST INBETWEEN THE TOP AND BOTTOM PANELS. THE TOP AND BOTTOM PANELS ADD AN EXTRA 3/4" EACH, MAKING THE TOTAL HEIGHT OF THE PIECE 2'-0". THE TOP AND BOTTOM PANELS COVER THE PIECE EDGE TO EDGE, BOTH BEING DIMENSIONED AT 1'-11" D x 3'-0" W.



*NOT SHOWN IN TOP
PANEL HERE ARE
THE THREE HOLES
FOR SENSORY WALL
ATTACHMENT.

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DATE

SCALE: 1/2" = 1'-0"

SHEET: A102

PIECE C: SENSORY WALL PIECE



THERAPLAY FURNITURE
PIECE PROJECT

CARMEL, IN

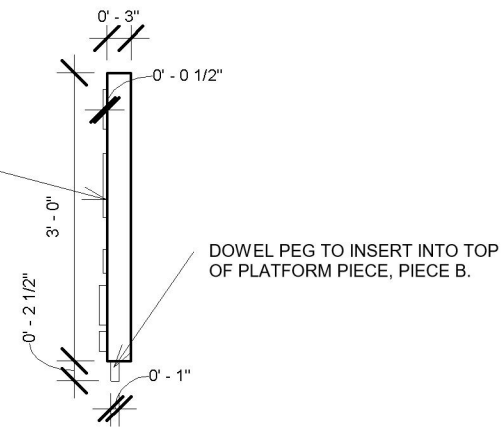
DESIGNING FURNITURE
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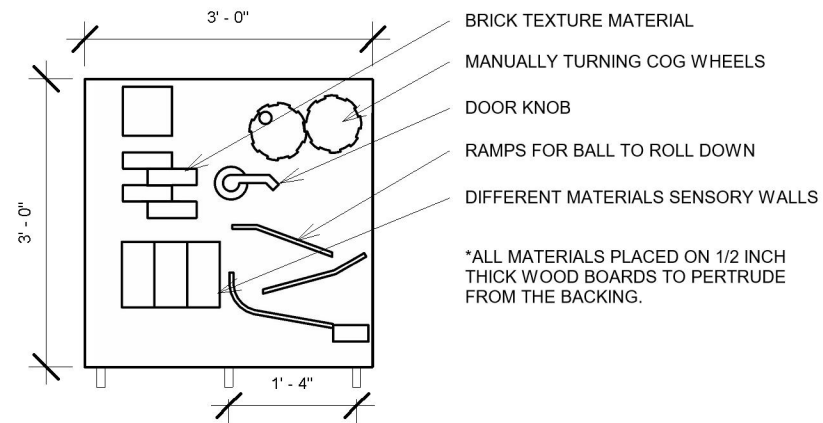
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SENSORY WALL
ELEMENTS; i.e.
TEXTURED
FABRICS/MATERIALS,
FINE MOTOR SKILL
ACTIVITIES, DOOR
KNOBS, SWITCHES,
ETC.



1 SIDE VIEW



2 FRONT VIEW

DETAILED PLATFORM NOTES:

NOTE:
PEGS ARE 1 INCH DIAMETER BY 2.5 INCHES LONG SCREWED INTO THE BOTTOM OF THE SENSORY WALL.
THEY ARE EVENLY SPACED 16 INCHES O.C.

SENSORY WALL ELEMENTS ARE APPLIED TO THE SENSORY WALL VIA RUBBER CEMENT GLUE OR SCREWS.

DRAWN BY	KELSEY PARK
COMPANY	BALL STATE UNIVERSITY INTERIOR DESIGN IDES 424 FALL 2020
CLIENT	THERAPLAY
DATE	

SCALE: 1/2" = 1'-0"

SHEET: A103

PIECE D: HAND RAIL PIECE



THERAPLAY FURNITURE
PIECE PROJECT

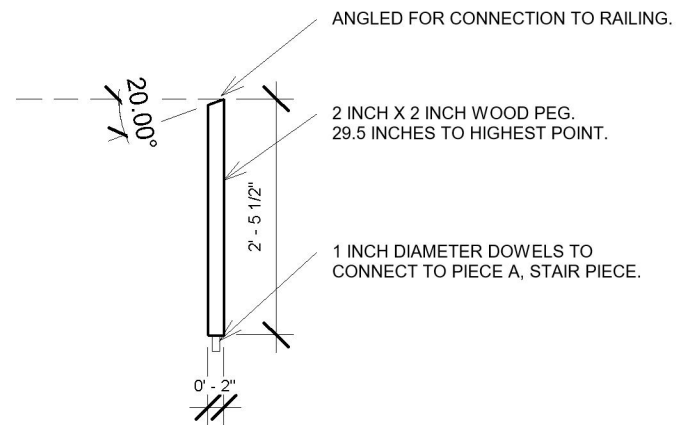
CARMEL, IN

DESIGNING FURNITURE
FOR OCCUPATIONAL AND
PHYSICAL THERAPY
PURPOSES

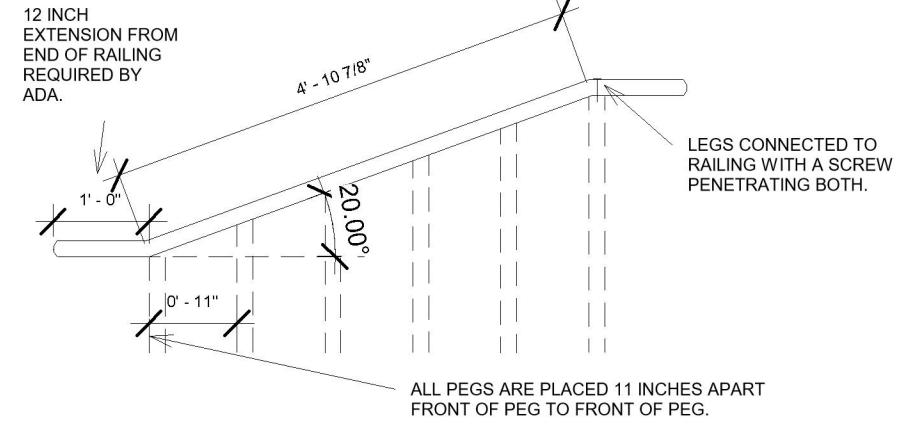


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IMMERSIVE LEARNING
PROGRAM



1 RAIL LEG - SIDE VIEW



2 RAILING - SIDE VIEW

DETAILED HANDRAIL NOTES:

NOTE:
RAILING LEGS ARE 2 INCH X 2 INCH (SQUARED).
THE 1 INCH DIAMETER ROUND DOWELS EXTENDING OUT OF THE RAILING LEGS ARE TO CONNECT INTO THE STAIR PIECE.
THE TALLEST POINT OF THE RAILING LEG REACHS 2 FEET 5 1/2 INCHES, WHICH IS THEN CUT DOWN AT A 20 DEGREE ANGLE FOR THE HAND RAIL TO REST UPON.

THE LENGTH OF THE ANGLED HAND RAIL IS 4 FEET 10 7/8 INCH, WITH 1 FOOT HORIZONTAL EXTENSIONS AT EITHER END.
THE LEGS ARE CONNECTED TO THE RAILING WITH A SCREW PENETRATING THROUGH THE RAIL INTO THE LEG, SHOWN IN FIGURE 104-2.

DRAWN BY KELSEY PARK

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