Project: Growing to Ground Greenhouse

Project Mission Statement

The Growing to Ground Greenhouse connects young children from birth to school age to the natural world through our greenhouse and surrounding garden space within Northfield, MN, where children experience hands-on STEAM (science, technology, engineering, art, and math) growth year-round.

About Project Leader, Jen Rothmeyer

Picture 1 Jen Rothmeyer

Jen Rothmeyer is the Owner and Lead Early Childhood Educator at Two Wishes Child Care located at 31 Lincoln Lane, Northfield, MN (FCC-C3 license #1081060) located in the Greenvale Park Elementary district. A United States military veteran, Jen earned a bachelor's degree with honors in psychology and her associate degrees in criminal justice and liberal arts. She holds a Minnesota Career Lattice step of 10B for childhood care practitioners and is a state-approved Minnesota Department of Human Services Trainer II (through MNCPD) in the field of early childhood and school-age care and education. Jen is a former Iowa Master Gardener.

Jen Rothmeyer's child care program is currently being assessed through the Parent Aware program (a project coordinated by the Department of Human Services with the Department of Education and Department of Health), and is striving for the highest rating available of Four Stars - to hopefully be awarded in July 2017. To her knowledge, her child care program will be the first four-star rated family child care program in Northfield with the next closest in Cannon Falls.

Jen is a member of the National Association for the Education of Young Children (NAEYC), Minnesota Association for the Education of Young Children (MnAEYC), the National Association for Family Child Care (NAFCC), the National Science Teacher's Association (NSTA), and the United Provider's Association (of Northfield and Dundas).

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Project Goals

The Growing to Ground Greenhouse project goals are:

- to utilize the greenhouse year-round to grow and harvest fresh food for use in the child care program
- to introduce children, their families, and the larger community to the entire life cycle of a plant from seed to sprouts to plants to harvest to saving seed to composting
- to engage children in cooking fresh produce that they grew and harvested
- to increase the physical and emotional health of the children by spending time in the garden space and greenhouse year round
- to educate children on nutrition in a hands-on and fun way
- to educate children on STEAM topics such as measurement, comparing and contrasting, building design, life science, agriculture, temperature, seasons, nature journals and sketches, garden planning, using greenhouse technological systems, and using microscopes, loupes, and other tools
- for children to gain a better insight into where their food comes from and the work farmers put into growing our food
- for children to develop in the social and emotional realms by planning and working together to select and grow their own food, by practicing patience and persistence, and by gaining self-confidence in their own abilities by claiming ownership for their work

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Community Outreach - Partnership with Two Wishes Child Care

Picture 2 Greenhouse during construction and before landscaping.

The Growing to Ground Greenhouse project was started by Jen Rothmeyer primarily for the purpose of early childhood education within her child care program, Two Wishes Child Care. The greenhouse provides a year-round hands-on source for STEAM (science, technology, engineering, art, and math) and nutritional learning activities at a developmentally appropriate level to children and adults of all ages. The greenhouse itself poses some accessibility issues due to its nature of a small accessory structure with steps sunk into the ground, but the wide doors on ground level allow persons who are unable to navigate the stairs to still be able to see everything happening within the greenhouse itself (from perhaps an even better vantage point!). Materials will be brought to those who cannot get into the greenhouse itself so that they, too, can experience the hands-on learning.

There are three separate pathways through which the greater community will have access to the Growing to Ground Greenhouse:

(1) direct clients of Two Wishes Child Care and their children will have access through the daily care of the children and through the client and community outreach events held at Two Wishes Child Care each quarter for no cost,

(2) Jen has offered to partner with other local child care providers and *their* clients for no cost, providing STEAM education and experiences to the children in other programs in the Northfield and Dundas area, and

(3) to the general community as Jen and Aaron (her husband)

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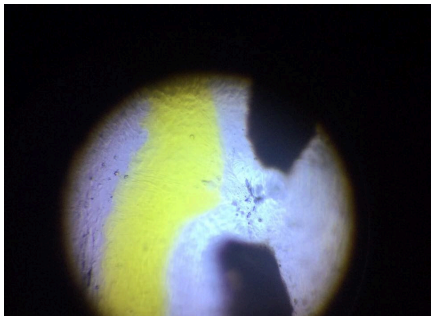
Rothmeyer are once again in the licensing process to become foster parents (after over three years experience in Iowa before moving to Northfield) and also routinely open their home to anyone in the area who wants to learn more about their projects and edible landscaping. Residents of the Laura Baker-owned house across the street have even been known to come over to cuddle the pet rabbits at the property (Jen issued an open invitation)!

Why is this valuable?

The children will be able to learn the entire lifecycle of plants as they prepare the soil, plant seeds, provide what seeds need to grow (heat, water, air), nourish their plants, harvest their food, save seed, and compost the remnants. Children will compare and contrast seeds, plants, and produce on a variety of different dimensions such as weight, height, shape, size, volume, texture, and color. Children will dissect seeds and look at them through our microscope and eye loupes.



Picture 3 School-ager peering through the microscope at a monarch chrysalis.

Picture 4 Preschooler looking at monarch eggs and milkweed leaves through an eye loupe.

Children also learn about the natural world as they watch insects land on their plants in the raised beds feet away from the greenhouse. They start to identify the insects (or at least learn about their characteristics) and ask questions about whether they are friends or foe!

The fruits (vegetables, and grains!) of their labor will be further used in cooking nutritious, wholesome food in the Two Wishes program space. Children will help prepare their produce through developmentally appropriate nutritional activities. Who isn't excited about year-round produce with fresh herbs, lettuces, and cold season crops available even in the winter? Two Wishes Child Care uses USDA curriculum Grow It, Try It, Like It, USDA book The Two-Bite Club, and the curriculum Learning About Nutrition through Activities (L.A.N.A.).

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With dozens upon dozens of different varieties of plants grown annually and our wealth of edible perennials (a dozen different herbs, six apple trees, a cherry tree, more than six raspberry bushes, approximately 32 square feet of blackberries, two rhubarb, four grape vines, six different types of strawberries, two different types of asparagus in multiple bunches, a gooseberry, and a currant bush), children get to taste and experience many different types of flavors.

Picture 5 Children helped plant our gooseberry.

Children begin to understand agriculture as they participate in growing their own food, planning through the growing cycle, trying different locations and seeing what works best (sun or shade?). They start to appreciate the effort farmers put into growing our food. They begin to understand nutrition as they start their own seeds, harvest their own plants, and cook their own produce. They are invested in and grow a greater appreciation for (yes, that is intentional humor) the variety of fresh produce available to them, feeling an ownership over their own health. Even better, they physically will have had to dig, scoop, pour, water, measure, navigate the land, balance while holding their seedlings, and MOVE during the process!

In Minnesota, we have a short warm season that doesn't lend itself well to experiencing the outdoors year round. That's not a problem with a greenhouse yards away from our program space. Children can suit up and head outside to enjoy the warmer space in the greenhouse, touching green plants and soil, and wondering at the marvel of growing and experiencing life science year-round. A few steps outside and they can lob snowballs or build a snowman. It's the best of both worlds!

Social and emotional development is also increased with the greenhouse as children work together cooperatively as they discuss where they want to plant, what they want to plant, how much, and

when. Children gain self-confidence, patience, and persistence as they see that they started with a small seed and are able to harvest pounds of food down the line.

The Standards

The primary audiences for this project are the children at Two Wishes Child Care. These children will get hands-on experience with the:

Minnesota Early Childhood Indicators of Progress (MN ECIPS)
Birth to 3

- Social and Emotional Development: Relationships with Other Children
- Social and Emotional Development: Communicating and Speaking
- Cognitive Development: Exploration and Discovery
- Cognitive Development: Problem Solving
- Physical and Motor Development: Gross Motor Development
- Physical and Motor Development: Fine Motor Development
- Physical and Motor Development: Physical Health and Well-Being

Minnesota Early Childhood Indicators of Progress (MN ECIPS)
3-5

- Social and Emotional Development: Social Competence and Relationships
- Approaches to Learning: Curiosity
- Approaches to Learning: Risk-Taking
- Approaches to Learning: Imagination and Invention
- Approaches to Learning: Persistence
- Approaches to Learning: Reflection and Interpretation
- Language and Literacy Development: Listening
- Language and Literacy Development: Speaking
- Language and Literacy Development: Emergent Reading
- Language and Literacy Development: Emergent Writing
- Creativity and the Arts: Creating
- Creativity and the Arts: Responding

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- Cognitive Development: Mathematical and Logical Thinking
  - Number Concepts and Operations
  - Patterns and Relationships
  - Measurement
- Cognitive Development: Scientific Thinking and Problem-Solving
  - Observing
  - Questioning
  - Investigating
- Cognitive Development: Social Systems Understanding
  - Human Relationships
  - Understanding the World
- Physical and Motor Development: Gross Motor Development
- Physical and Motor Development: Fine Motor Development
- Physical and Motor Development: Physical Health and Well-Being

Next Generation Science Standards (NGSS)

- Interdependent Relationships in Ecosystems: Animals, Plants, and Their Environment
- Weather and Climate

Core Knowledge Preschool Sequence

- Mathematical Reasoning and Number Sense goal: Sort and Classify Objects or Pictures of Objects
- Mathematical Reasoning and Number Sense goal: Perceive and Recognize Shapes and Sizes
- Mathematical Reasoning and Number Sense goal: Use Simple Measurement Skills and Seriate Objects
- Mathematical Reasoning and Number Sense goal: Quantify Groups of Objects
- Orientation in Time goal: Establish Reference Points in Time
- Orientation in Time goal: Demonstrate an Awareness of the Passage of Time and of Periods of Time as "The Past," "The Present," Or "the Future"
- Orientation in Space goal: Understand and Use the Language of Space
- Orientation in Space goal: Establish Reference Points in Actual and Represented Space

- Orientation in Space goal: Use Simple Maps of Familiar Environments
- Scientific Reasoning and the Physical World goal: Demonstrate an Initial Understanding of the Living World
- Scientific Reasoning and the Physical World goal: Demonstrate an Initial Understanding of the Elements of the Material World
- Scientific Reasoning and the Physical World goal: Select and Use Tools
- Visual Arts goal: Attend to Visual Detail of Objects and Images
- Visual Arts goal: Explore and Create, Using Various Art Forms, Media, and Techniques

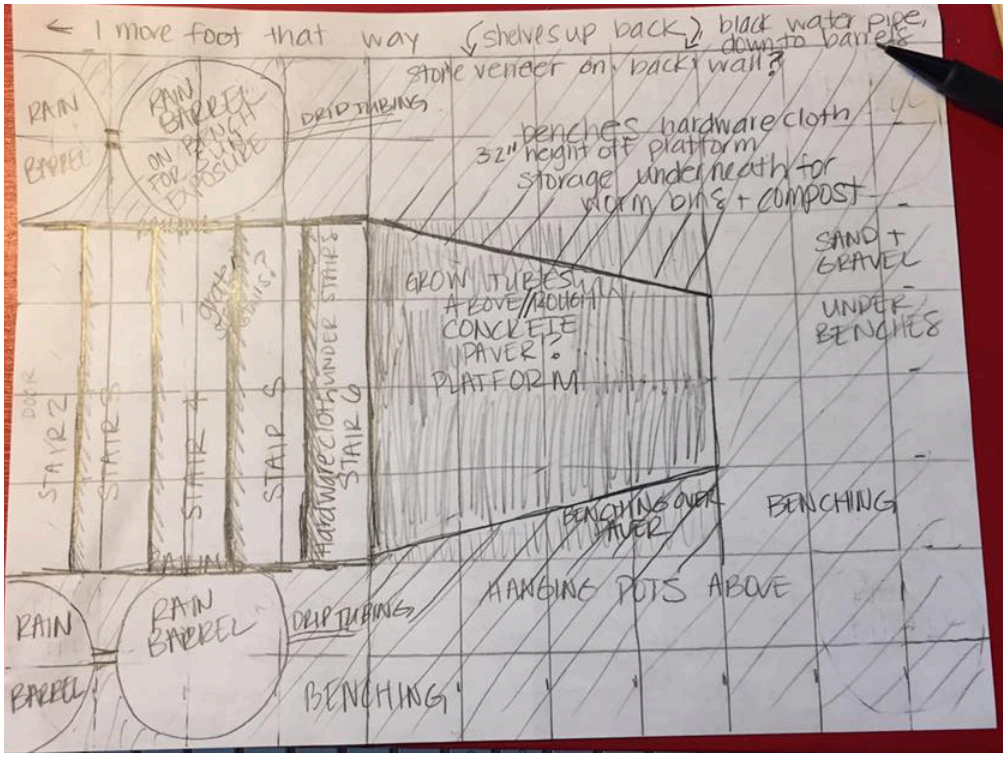
Design and Construction

The Growing to Ground Greenhouse was designed through collaboration between Jen Rothmeyer (former Iowa Master Gardener and owner of local business Two Wishes Child Care), Aaron Rothmeyer (Jen's husband), and local business owner Billy Minnehan of Einstein Remodeling. The modified walpini-style greenhouse's design was informed by the Cold-Climate Greenhouse Resource written through a collaboration of the University of Minnesota's Center for Urban and Regional Affairs (CURA) and Center for Sustainable Building Research (CSBR) and the Southeast Regional Sustainable Development Partnership linked below.

The Palram Essence Twinwall 8' x 12' x 8' greenhouse - a moveable, lightweight product with a thin, extruded aluminum frame and 4mm-thick translucent polycarbonate plastic panels, is located on the south end of the property in the best location appropriate for receiving sunlight at 31 Lincoln Lane (Parcel ID 22.36.3.02.029). Other locations were scouted and determined that instead of adding landscaping, bushes and trees would need to be removed in order to have a functional greenhouse. The greenhouse is a modified-walpini-style greenhouse wherein you walk down a staircase into the greenhouse, which is partially located belowground. It is sitting on a six-feet-deep tin-and-treated-wood frame that was constructed to hold back soil and allow ground heat in winter to rise up to warm the plants. The frame is hoped to increase the environmental and sustainable practices with this garden structure, increasing the crop-raising potential by

capturing solar energy and decreasing the need for accessory heat, which will conserve energy.

The floor of the greenhouse will be located 4’ underground with the wooden-and-chicken-wire workbenches located around 30” off the floor (so that children will have better access to see and participate in the activity). These benches will not be visible from the street. Additional cascading planters will hang from the roof of the greenhouse along the inside and there will be a stone facade up the back wall with shelving for greenhouse accouterments and plants. Currently, the planned stone facade is Designer's Image Carbon Rustic Thick Stack Real Stone Veneer Panel sold at Menards. The floor is two feet off the ground to allow for a cold sink.



Rain barrels will be located below the workbench and on the workbench with several goals: (1) to assist in passive heating so the greenhouse achieves its year-round goals of educating and nurturing children, (2) to collect rainwater from the roof of the greenhouse,

reducing stormwater runoff, and (3) to conserve city water by using storm water for the plants within the greenhouse and through watering cans to the plants around the greenhouse. The rain barrels will not be visible from the street or other properties due to being under the ground and being blocked by the wooden raised beds and landscaping in front of and beside the greenhouse.

Insulation will be going down at an angle from the exterior frame and covered with soil to help protect the greenhouse from frost. At the time of this writing, the insulation and soil has not yet been placed at the greenhouse. Once it is placed there, the area directly west, south, and east of the greenhouse will be re-seeded or sodded. At that time, you will not be able to see the tin frame-exterior of the greenhouse at all. If the insulation does not serve its purpose well, we will also be insulating the frame itself. We are recording temperatures in the greenhouse this first year to determine the amount of insulation needed to determine whether the inside will also need insulation for winter growth.

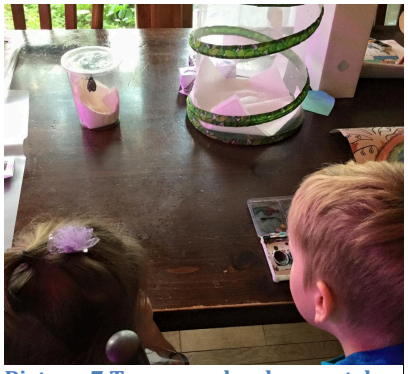
Landscaping

Landscaping, aimed to partially hide the greenhouse from view of the street and other properties, will complement the greenhouse itself - by trees, bushes, the curved raised beds already in place, and the native, pollinator-friendly garden planned for the area near the curb and driveway. The planned garden type is a densely planted clumping cottage-style garden wherein multiple types of the same plant are together in groupings, edged with appropriate edging material (to be determined at that time to match other materials at the property).

Picture 6 Cottage style garden with plants clumped with like plants.

These native-friendly gardens do and will provide a wonderful, environmentally-friendly, and pollinator-friendly view between the

street, other properties, and the greenhouse itself. In addition, the gardens will assist us in our annual Two Wishes Child Care's Monarch Conservation Project from which we raised over a dozen monarchs in our inaugural year while simultaneously teaching children about their natural environment.



Picture 7 Two preschoolers watch a monarch eclose from its chrysalis.

Additionally, a row of hedge-type, dense arborvitaes (most likely 'Emerald Green' to match the many existing arborvitaes) is planned on the north-south dimension next to the driveway just east of where the apple trees are currently located, with an arbor that will be at the north end of the driveway to allow access to the side yard from the garage and driveway area. This matches the existing arborvitaes that are on the west side of our property curved around our garden shed and also on the west side of the garage. The row of arborvitaes will simultaneously curve around the inside of the raised beds for several feet in order to help block the view of houses to the west of our property of the greenhouse (such as parcel 22.36.3.02.015 and 22.36.3.02.016). This will still allow the greenhouse to be functional since typically sun from the southwest is unwanted and overheats the greenhouse in the afternoons. Arborvitaes are an evergreen that are popular for hedges, are dense, and can reach 10-20 feet tall (although we would be aiming to trim them at a height of around 10 feet consistent with the height of our home's roofline).

More columnar apple trees will be planted and located within the north-south line of apple trees currently next to the driveway as well, with rhubarb and strawberries (as ground cover) along the driveway under the apple trees.

On the east side of the property, two bushes have already been planted in order to help aid in blocking the view from parcel 22.36.3.02.012. More are planned to the south of the current location for next spring. One full-sized apple tree has been planted to the west of the greenhouse and will grow with more time.

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Picture 8 An example of a slide on ground level.

The north slope of the greenhouse project is expected to have a children's garden as well as a slide along the northwest edge (hidden from view) with pavers going up the south side of the slope. The slide will be on ground level without legs and will not be visible from other properties.

While parcels 22.36.30.2.014 and 22.36.30.2.013 will have a view of the greenhouse from their properties, one of those properties is a Laura Baker-operated home and the other has already given written consent for the greenhouse at its current location.

Specifics:

- The Palram Essence Twinwall greenhouse, manufactured in Castle Rock, MN, was purchased through a $1,000 grant from the Rice County Public Health's Statewide Health Initiative Project Coordinator and an additional $221 investment by Two Wishes Child Care.
- Over $836 in wood was purchased from Lampert Lumber.
- The construction equipment was rented from Rent'n'Save for $451.11.
- Labor, tin, and construction equipment was provided by the owner of local business Einstein Remodeling (we have yet to receive the invoice).
- Rain barrels were purchased from residents of Faribault through their Online Garage Sale website.
- Future purchases will be made from local businesses to further the active and passive measures for heating in the greenhouse as well as the watering systems.

Resources

- Two Wishes Child Care
- MNCPD
- Parent Aware
- National Association for the Education of Young Children (NAEYC)
- Minnesota Association for the Education of Young Children

(MnAEYC)

- National Association for Family Child Care (NAFCC)
- National Science Teacher's Association (NSTA)
- Next Generation Science Standards (NGSS)
- Core Knowledge Sequence for Preschool
- Statewide Health Initiative Program
- Cold-Climate Greenhouse Resource
- Grow It, Try It, Like It curriculum
- L.A.N.A. curriculum