ROADMAP

For Earthouse at Anamakos / Fall and Winter 2018

A research project and Action Plan for Transforming an old triplex in Providence, RI into a Regenerative Home.

CREATED BY

Tara Gupta
& Serafima Kovalevskaya
with guidance from Markus Berger.

C O N T E N T S

PART THREE: IMPLEMENTATION

APPENDIX

PART ONE: **THE PHILOSOPHY**

Introduction

The Necessity of Adaptation

We are in a troubled time. The extended periods of hot weather and the increasing number of natural disasters are only the tip of it. There seems to be endless crises: A Housing stock Crisis, Sustainability Crisis, and a Mental Health Crisis to name a few. In order to start addressing the issues of well-being, we need to address our material problems, and create a firm foundation.

When we think about our material world, and how we can leverage it to affect these larger systems that are spiraling out of control, it makes sense to turn to the adage “change starts at home”. In many places around the world, we have mobile populations, growing homelessness, and a need for sustainable structures to deal with the new extremes of weather. Anamakos, a sustainable co-living company, seeks to address these issues, starting in Providence, RI with the adaptation of the housing stock available already.

The following document outlines the Roadmap for our first house, the prototype for sustainably adapting this typology of building so that it can transform into a structure that is ready for a new era.

Why create change through Housing?

Housing is essential to our lives. *Shelter* and *protection* is just the beginning of it. A house is the place where we perform so much of what we call *life*. We create warmth, wellness, and joy in whatever we call our *home*, and that so often is attached to place and the structure of a house. Going through different experiences in a place creates memory of that place, and solidifies its importance as a character in our lives. Ideally, a house then should support all the inevitable associations its residents will make with it, and cater to emotional wellness and abundance.

Collaborative housing & Alternative Housing

In order to understand the alternative we must define a “norm,” and there is room for criticism in defining any norm because there is always a bias by the person defining the “norm.” Our bias leads us to understand the norm of housing in Providence to be oriented towards couples, and multi-generational families. Sometimes a group of singles subverts this by renting out a place intended for a couple or a couple with kids, which often happens because of the large student population in Rhode Island and therefore high number of singles and recently graduated young professionals. But most often, the single family structure is held as the ideal and the eventual goal, which single individuals, couples, and elderly are either on their way to achieving or are past. This assumption does not account for variations, or for fluidity in relationships and lifestyle choices. Therefore, some alternative models have arisen to try to solve these problems for different groups that fall outside its lines.

One of these models is the Co-op. A couple examples are Watermyn Co-op, originally student-oriented but now a place for many semi-transient individuals seeking companionship and activity in a living situation, and Finlandia, a student housing organization affiliated with Brown University, focusing on creating affordable options for Brown students. Alternatively, a co-op that caters to an older group in Rhode Island is the Listening Tree Co-op, which just started recently in Chepachet, RI. As the Listening Tree Co-op caters to a less transient crowd, they offer optional

shares so each person of $42,000, a portion of ownership of the house which can be paid over time with a $5k down payment.

Another model is artist-oriented co-living and co-working projects such as AS220 and *The Dirt Palace*. These are the larger and more well-known artist takeovers of space in Providence. AS220 is now a prominent shaper of the downtown arts scene of Providence, owning several buildings and, in-line with their mission, providing affordable housing and workspaces for artists in the city. *The Dirt Palace* is an adaptation of an old library into a feminist art space, hosting 7 artists-in-residence at a time.

A third essential collaborative living model to know, before we get into the nuances of the model of Earthouse and the choices we have made in this particular project, is the more commercial co-living options in larger nearby cities such as Boston and New York. This type of housing is less about social cooperation between residents and more about curated opportunities to meet other people within a bigger building, while maintaining your own space and individualistic life. This option includes companies such as WeLive, which has co-living buildings in Washington D.C. and New York, and Ollie, which is building an all-inclusive co-living building for Boston set to open in 2020.

Earthouse defines its own position in the spectrum of co-living by putting relationships and social wellbeing at the forefront of decisions, but also by enabling semi-urban sustainability in Providence, RI through the organization and adaptations of the house itself. As you read on, we will investigate the specific decisions made in adapting the house, and the trade-offs that arise with each choice.

The naming of Earthouse, & Anamakos

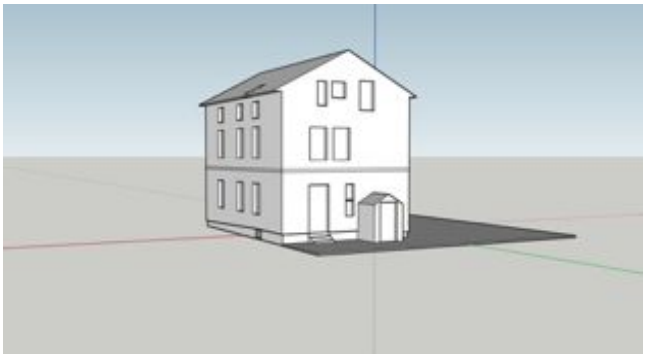
Earthouse is an unusual name for such a project because it refers to a sheltered, partially buried form of architecture where the mass of the house is formed by a “berm,” which provides temperature-regulating heat from the constant store of the earth’s body. For this house, the name Earthouse refers to this connection to the earth in a more ideological way, calling attention to our energy-heavy ways of living and asking for more balance from the structure of the house in meeting human needs and maintaining the state of the surrounding ecosystem, watershed, and land. This house is named Earthouse in protest of the state of infrastructure today, opposing society’s predominant mindset of scarcity and individualism.

Anamakos, the larger concept that surrounds the project *Earthouse*, is a made-up shortened form of Annamaya Kosha. This is the yogic term for the physical body, or the food body, the body that is created by the food we eat, or in other words, what we put into it. This is the first of 5 bodies, and is essential as a foundation for the Pranamaya Kosha (the energy body), the Manomaya Kosha (the mind body), the Vijnanamaya Kosha (the wisdom body), and the Anandamaya Kosha (the bliss body). The mission of Anamakos is to reshape our physical infrastructure by re-aligning the inputs we put into it.

The House

At the inception of *Anamakos*, the search for the right house to begin with was essential. It had to be walkable and close to universities, work opportunities, grocery stores and farmers' markets, and recreational opportunities. It had to have the potential of a lively and yet relaxing collaborative home, and it also had to be imperfect enough to ask for experimentation with the structure. The house found at 1 Trenton St, Providence RI 02906 was on the corner of two busy streets, and close to all the necessary amenities, lending itself to a connected and communal lifestyle. The issues posed were that perhaps it was too public in certain ways, with the windows pressing up against a busy sidewalk and foot traffic from neighbors who would walk right through the driveway to cut corners while going to school.

At the time of purchase, the house has its main systems up and running, for heating and water, yet there were many problems such as water spillage in the bathrooms and the old age of the boilers in the basement, that made the house a candidate for sustainable alterations.



The Neighborhood

Earthouse is situated in the Fox Point neighborhood. The neighborhood make-up is largely college students and graduate students of RISD and Brown University, and young professionals in their 20's and 30's. The neighborhood used to be predominantly Portuguese, and still shows that cultural influence through its annual Portuguese festival, and in a small shop owned by an older couple called "Friends Market."

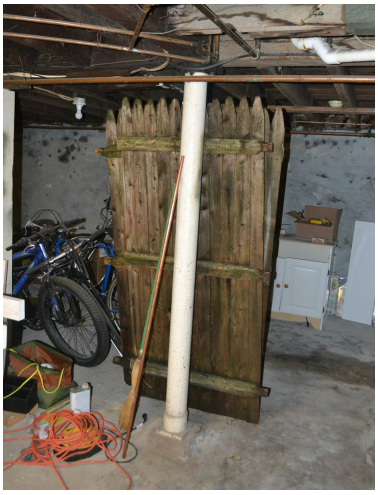
The house is situated on Trenton St.The landlords on Trenton St include people from a variety of backgrounds, including a real estate investor who invests in larger properties as well, a construction manager from New York, a Cape Verde family, and myself. So far, we have had very positive relations with these owners, from befriending the kids from the family two doors down, and introducing them to the fish, plants, and systems of the house, to sharing contractors with the neighboring Landlord. The more social capital we invest in, growing these relationships, the more our ability to affect and collaborate with our surrounding community grows.

Design

"To design is to devise courses of action aimed at changing existing situations into preferred ones."
-Herbert Simon

Recycling and Reuse

One important element of sustainability by design is re-designing without waste, or by limiting waste, taking our zero waste culture into the structural and aesthetic changes of the house, and not just the lifestyle lived inside of it. This means sourcing materials from sustainable sources, and in ways that adhere to the recommendations of *Cradle to Cradle*, separating technological and recyclable materials from organic and biodegradable materials, and this includes planning for a material's second life, through decomposition, reuse, repair, or upcycling.



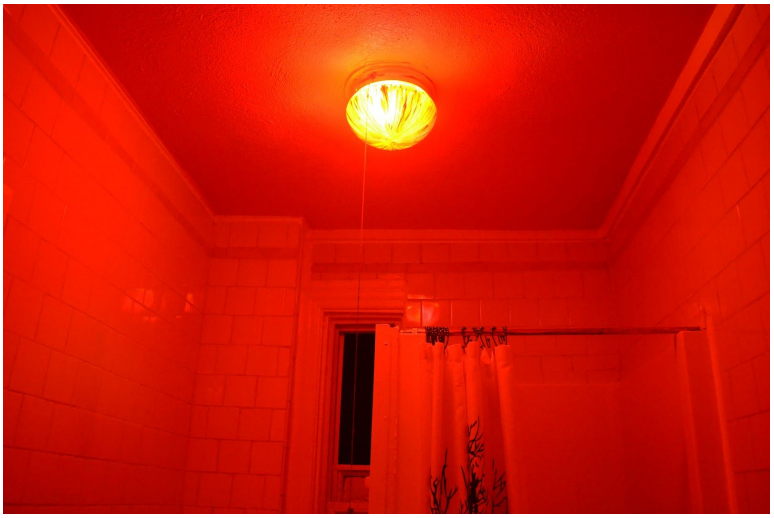
The EPA refers to trash, or municipal solid waste (MSW), as various items consumers throw away after they are used. The total generation of municipal solid waste in 2015 was 262.4 million tons or 4.48 pounds per person per day[1]. Excluding food waste, yard trimmings, and other organic waste, about 70% of this 262.4 million tons are material fabric related and could be considered for repair and reuse.

One such example of this reuse is the upcycling, a transformational form of repair that creates an object with greater function than the salvaged material the object was made from. We have participated in upcycling fencing material into walls for a reuse station in the basement, and for raised bed walls out in the garden. The deconstructed fence, now a raw material to be used for these projects, is shown above, in the basement.

Another example of reuse is the salvaging of carpet samples from the rug shop a couple doors down from us. They normally throw away their rug samples, and have piles and piles of high quality, soft rectangles of carpet. After a discussion with a worker at the shop, Serafima was able to salvage all the samples put out for free on the street. We are using them as a patchwork rug for a room we call the "rug room," which we use as a floor-working space, a meditation space, a projector room, and a meeting space.

[1] https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/national-overview-facts-and-figures-materials#NationalPicture (the waste generation rate in 1960 was just 2.68 pounds per person per day.)

Color and Light



Color, surfaces, and light play an important role in shaping the experience of being in a place, including creating a spirituality of place and having an effect on mood and wellbeing. For that reason, we addressed issues of color first, introducing vibrant colors such as red and orange hallways and a deep green living room, to activate public spaces and stimulate different paces of movement and activity in different parts of the house.

Enclosures

As this used to be a 3 family space, with separate groups living on each floor and not interacting, we now have an adaptive reuse challenge of addressing the thresholds between public & private spaces, and the interstitial stretches between them.

For example, the kitchens on the first floor and second floors are used to cook public dinners, but as there are rooms and showers on each floor, the person who lives on one of these floors might want to shower, and might have to cross the kitchen in their towel to get to the bathroom.

Material and Details

The house is older, dated 1930 by its records, so it is essential to work *with* the age and adopt an attitude of reuse & repair when maintaining it. As we address the larger issues, it is important to also pay attention to the details, such as re-finishing the trim around the window, or touching up a paint splatter. The attention to detail affects quality of life, mood, and overall happiness of the residents, and therefore can have ramifications on the social environment created.

One example of our attention to detail was a remodeling of the the third floor bathroom. This started with a deep clean, as the previous residents had kept a kitty litter box in the bathroom, and the floor was peeling up from water damage. Next, we created a structure for the shower curtain, to fit the unique situation that the slanted ceiling presented, while keeping the charm of the old, clawfoot bathtub in the space.

Attention to detail includes keeping parts of the house that might be neglected, otherwise, in top shape. This includes large-scale cleaning of spaces like the basement and attic as well as regular cleanings of the house by the residents.

Trade-offs

The idealist in me would like to create a utopia, but the reality is that any utopian creation fails to acknowledge that decisions always involve compromise. For this project, we have not done a gut renovation of the house but instead taken the approach of minimal interventions, low waste and slow material use, and frugality. These factors, material use, financial cost and returns, and waste production, are all parts of sustainability that so often are not considered in adapting structures to become more “sustainable”. Designs of Passive structures are now widely known. But while these meet our needs theoretically, are our needs more complex and connected, requiring measured but immediate changes, and attention to the interconnectedness of material and energy.

Minimalist Interventions

To really achieve sustainability at scale, and transition to a circular, efficient economy and infrastructure, we must find ways to achieve maximum impact through minimal intervention. Design and research should be abundant, & action measured. This is the approach we take with Earthouse. When there is pause, and thinking, designing, and building take place, there is ingenuity rather than just money thrown at a problem. Financial constraints and interests can actually work hand in hand, here, with sustainability. Financial constraints *require* the minds on a project to get to work, and find less material-intensive, labor-intensive ways of solving problems.

Our Approach: Connected and Urban

Our approach to sustainable changes is connected and urban. So far, many housing projects that have pursued the problem of sustainable design have instead made infrastructure that is independent, decentralized, self-reliant. For many of our large systems, energy, water, and land, our trade-off is that we choose to remain connected to the city, employing our ideals in a way that requires that we get involved at a larger scale, such as with water and land. This helps us to avoid falling prey to the illusion that once we have solved the problem for our little bubble, our work is done. The result of this approach is that we must create a new ideology for ourselves, one that focuses on transition, prioritizes people and the city, and generates social infrastructure whose sustainability is just as vital as the structural infrastructure. In this ideology, we begin to build on the existing dialogue around sustainable architecture, and plug into a global conversation for a just transition.

Lifestyle

Zero-Waste Lifestyle

A lot of the daily requirements of residents that create waste involve the food and hygiene products purchased at the grocery store. Focusing on minimizing grocery store waste, in tandem with creating a culture of salvaging and reuse, has allowed us to move the house to a virtually zero waste lifestyle.

For groceries, many of the tenants use jars provided to buy in bulk for items such as granola, oats, nuts, and grains. They buy at Whole Foods, which currently has the most extensive bulk section, but still has many sticker and ties and rubber bands on most of their produce, and maintains a company policy of not allowing customers to bring in their own glass containers, to avoid liability,

Cleaning supplies such as the compostable dish brushes to the left, from *Kuechenprofi*, and hygiene products such as the toothbrushes to the right, from *Isshah*, are ordered online from brands that focus on providing items in compostable or reusable packaging.

A low waste kitchen cabinet on the first floor of Earthouse.

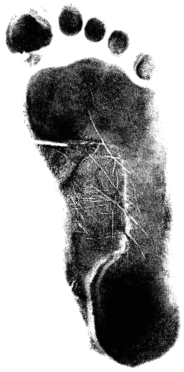
Handprint and Footprint: Local and Global

It is important that we measure the handprint and footprint of individuals in the house, to check for their own purposes as well as ours how the house has affected their life and activities in relation to waste, climate, and earth.

The Handprint is broken down into these metrics:

1. Tree/plants care and planting
2. Wildlife care and ecosystem/biodiversity support
3. Humanitarian care
4. Resource sharing
5. Carbon sequestration activities
6. Air purification activities
7. Water Quality activities
8. Waste clean up activities (including Upcycling and reuse activities)

The Footprint is broken down into these metrics:



1. Style of Home you live in
2. Transportation modes and frequencies
3. Diet
4. Waste habits
5. Consumption patterns of clothes, furniture, technology
6. Workplace

We have yet to implement these metrics in the house, and should find a fun, low-pressure way to implement these at Earthouse.

Social and Emotional Wellness

HOUSE MEETINGS

Every other week, we meet to go over house goals and projects, and hold an open space for anything that needs to be discussed in person as a group. During this time, we've taken on issues of programming and logistics, such as compost instruction and organization of common spaces for multifunctional use, but we've also discussed social elements such as communication styles and personality types. Here, we have the opportunity to examine our social relationships and the social economy of the house by understanding each other through frameworks such as love languages, Ayurveda, and Myers-Briggs. This understanding allows us to better meet the needs of each other, and avoid conflict and miscommunication in the first place.[2]

[2] See example notes from a bi-weekly house meeting on October 30, 2018 in appendix.

COMMON SPACES

Incidental social infrastructure in the common spaces, such as a projector on the first floor, or a common kitchen table to eat meals at, or a garden and fish that need to be tended to, provides opportunities for organic interactions. Maintaining existing successful “social infrastructure” and intentionally creating spaces for collection and spaces for solitude to varying degrees creates a house that meets all needs, adaptably.

CONFLICT RESOLUTION

An important element of social wellness is designing a strategy for conflict resolution. Inevitably, in a co-living space with 7 people running into each other all the time, conflict will arise. After experiencing some miscommunications and tension, we decided on a base strategy of communication in person between the parties in conflict, in the presence of a neutral peer-mediator who lives in the house. During this session, both parties will be encouraged to practice de-escalation of conflict, and use non-confrontational, collaborative language in expressing ideas, emotions, and tensions.

COLLABORATIVE COOKING

A wellness element that has emerged naturally in the house is the sharing of cooking. Whoever is home, and has already cooked, often offers food to whoever walks into the house, Through the constant flow of known people in and out, and the shared burden of groceries through collaborative means such as CSA shares, a culture of care through cooking has formed. This task, while mainly supported by a few people who love cooking and are always participating, is shared and passed off from person to person. It becomes a way for people to get to know each other over time, and express affection. The kitchen, therefore, is a very important wellness structure for the household.

PART TWO: **THE DESIGN**

Design

Design is an explorative tool for analyzing the potential changes that can be made to the house to make it more sustainable, and the ramifications of each change, good and bad. At this point in the evolution of sustainable architecture, there are endless solutions available for adapting such a house to make it more passive and environmentally aligned. Our approach to design, then, is to explore these possibilities, and recombine them in a way that is best suited to this particular house and city, the time we live in, and the type of resident we are targeting. In this section, we will analyze possibilities that have come up through this investigative process, and identify what interventions optimize positive change with minimal interventions, deciding on actions to pursue further in the implementation stage.

Heat, Energy, and Ventilation

The Building Envelope

In order to get to net-zero, and make this a truly passive house, we need to update the building envelope to be super-insulated and air-sealed to trap heat in the winter, yet flexible enough to allow for convection and air movement through the summer. As of now, the building envelope is not too tight because of its lack of insulation, and construction as a multifamily house. Hot air gets trapped in the summer in the 3rd floor due to lack of ventilation, while in the winter, the heated air escapes through the cracks in the building envelope, such as the space around windows and doors.

INSULATION: Right now, the exterior wall of the building has an R-value of 2, because there is 6 inches of air space between the exterior and interior wall surfaces, and each 3 inches of air space creates an R-value of 1. A common way to get R-value to 22 is to employ RISE Engineering to fill the walls with cellulose fibres. This requires the removal of knob and tube wiring. In our case, virtually the whole house has knob and tube wiring, so we would require an electrician to rewire the house in Romex.

An alternative to the cellulose fibre used to fill the wall cavity is recycled fabric insulation, such as the material created by Bernardita Marambio (https://www.bernarditamarambio.cl/Demode). However, with the intensive gutting and debris that would be required in the installation of such insulation in the interior walls, we are hesitant to install this material inside the walls.

After this intervention, to raise R value another 15, we can add polystyrene cladding to the outside of the building. This is an intensive process that requires all the shingles to be removed and replaced, so we have determined that at the moment this is not worth the material, cost, and labor.

ATTIC INSULATION

Fire damage can be seen in the attic on the original boards. Re-roofing was done the year before I acquired the house, in 2017, and there seems to be plywood covering the portions of the boards where there were holes. RISE

Engineering's suggestions are a 14" layer of R-49 Class I Cellulose blown-in insulation and a 12" layer of R-38 unfaced fiberglass batts for damming insulation.

KNOB AND TUBE

In order for RISE to fill in the air gap between the outer and inner wall with cellulose fiber insulation, the active knob and tube wiring must be removed. This is an old, ungrounded form of wiring that required air space around the wires, and can catch fire when cellulose fiber is filled in around it.

Left: Active knob & Tube Wiring in Attic, Taken November 26, 2018 by Kelco Electric

Ventilation

When we seal the building off through super insulation of the building envelope, we create blockage of the air flow that normally was moving through the house through natural draft. Because of this, we have to create artificial draft through ventilation, or else moisture collecting in areas such as the bathroom, kitchen, and basement may create mold problems. There are different ways we might go about ventilation, some of which we have explored below.

Whole House Ventilation

One option for ventilation is the whole house fan. A passive iteration of this is the solar attic fan. Total Cost estimated is installation ($1000) + fan ($550) = $1550. Another whole-house ventilation system suggested for cold-climate houses is an ERV, or Energy Recovery Ventilator. The cost of this system runs at about $1100 + installation.

Spot Ventilation & Dehumidifiers

An alternate way to address ventilation is spot ventilation. We are currently using fans in each bathroom, which is a non-invasive way to ventilate, but for a more formal system, we might consider installing exhaust fans for each bathroom, and if the situation is still dire, then dehumidifiers as well.

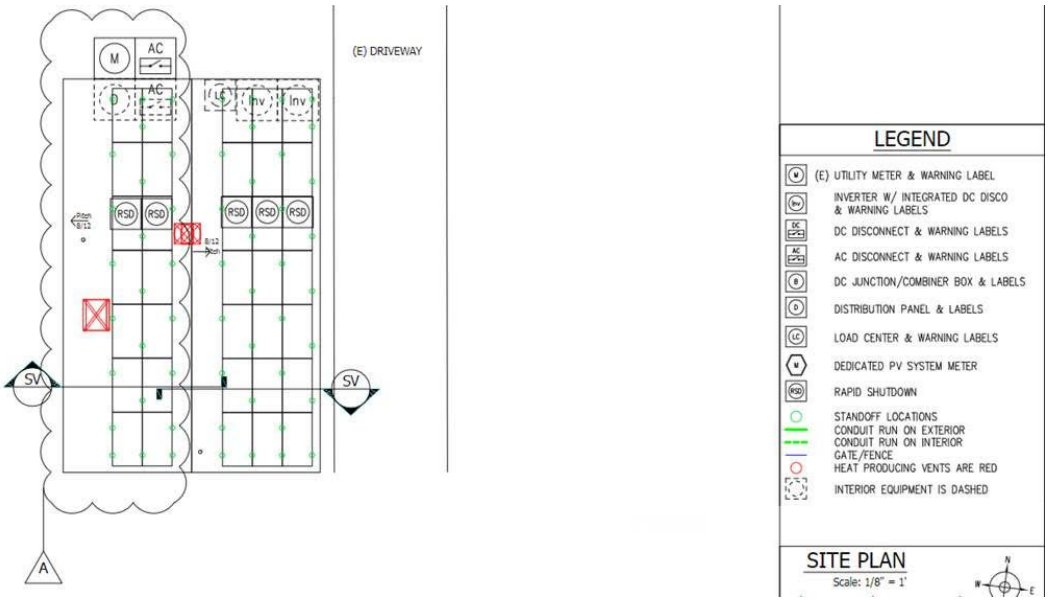
Lifestyle Changes

Our philosophy, outlined in the introduction, specifies that an important aspect of our approach is trade-offs, and lifestyle changes. Our approach to sustainability includes active participation for the user of the system, the resident. An informed resident will need less technology around them, and will know how to use the systems that are available to them in a way that preserves them. An example of this is that the informed resident should not take hot steamy showers when there is cold, high speed winds outside, because this will create the conditions for mold.

Renewable Energy

We have invested in solar panels from Tesla-owned company, *SolarCity*, which cover 92% of the energy usage of the building, before building envelope and appliance updates. The system is 11.38 kW in size, and should be substantial, producing more at certain times of the year than we consume, and less on very heavy days. The estimated amount to be produced the first year is 11,458 kWh.

This should mean that we will have a surplus once we finish updating the building. As we are connected to the grid, this surplus will be used by neighbors.



Existing: Heating Systems

Providence, RI experiences extreme cold during the winter, and, more recently, extreme heat during the summer. An auxiliary, or supplemental, heating system is thus required even for the most insulated house, for back-up heat in times of extreme cold. And while a cooling system is seen as a luxury still, I would argue that is essential as a back-up in the summer, to prevent health issues such as heat stroke.

Our solution to this is to make sure the heating and cooling systems are operating at peak efficiency, within the limitations of the systems themselves. This means updating the HVAC systems themselves, but as a first step, controlling the existing heating systems with a more precise *Nest* thermostat, an alternative to the older mercury-filled thermostats previously regulating the house.

Currently, we have 3 types of auxiliary heating systems, a different system for each floor. They all run on gas. The boiler for the first and second floor heating systems is located in the basement. The boiler for the third floor heating system is located in a closet on the third floor itself.

Above: First floor, forced steam heater
Below: Second floor, forced air radiators lining the walls

Right: Third floor, gas boiler

Proposed: Central Heating & Water Heating Systems

As the current systems are old and will need to be replaced soon for efficiency, as well as per the requirements of RISE engineering, we must look into various options for heat and hot water. Below are various options, each with their pros and cons.

OPTION 1

Navien Combi-boiler, as recommended by RISE Engineering. The Navien Combi-boiler, shown to the right, operates on natural gas, which is currently considered the most efficient and affordable option. However, as we have a large solar array producing our own electricity, we have the flexibility of going gas-free by opting for an electric system, such as Ductless Mini-splits.

OPTION 2

Electric Heat pumps, Traditional Air-Source Electric Heat Pumps. The type of electric heat pump we would invest in would involve a system of ductless mini-splits, because our current HVAC system circulates hot water and does not have the infrastructure to circulate air. The recommended brand is often *Mitsubishu*, although they are also the least affordable. Even with financing, the steep price of this system for the whole house in contrast with current natural gas prices for heating the house with our old boiler system makes it a job with negative overall returns. The question of financial returns as a key aspect of sustainability in our definition emerges here in whether or not we will decide to implement this system.

OPTION 3

Geothermal Heat Pumps. Another option we have considered for the HVAC system replacement is a geothermal heat pump system. This system draws heat from the Earth underneath the house, and transfers it into the house. However, there have been dire consequences, such as changes in the bioclimate, in places where this has been implemented.

Passive Solar Design

Passive Solar Design involves maximizing the sun's energy to heat and cool by changing the structural design and materiality of the building. Insulating and sealing the building envelope is the first step to this. We have explored various options, and determined a couple technologies that would add to the passive performance of the building. These are low priority, and will be added after the larger interventions, such as insulation and solar panel installation, are addressed.

- Double-paned windows that trap/amplify heat in the winter
- Furniture & objects that create Thermal mass
- Solar Attic Fan

Water

Water cycles through our use, and most of the time we are taking it from the city with chemicals, lead, and chlorine running through it, then returning it to the city with various toxins and waste items, often that are not biodegradable, running through it. Our goal is to have a positive effect on water, to purify and dechlorinate the water when it comes into use in the house, maximize use while in the house through greywater recycling systems and rainwater harvesting systems, and regulate what goes into the wastewater stream by only allowing biodegradable products into the water stream. As this idea develops, we hope to expand upon what it means to positively affect water infrastructure and habits.

City Water: Implications

Existing Water System
Currently, we rely on *Providence Water* for our inputs (tap water, showers, toilet water), and the *Narragansett Bay Commission* for our outputs (sewage). The line supplying our water from the City System is a lead pipe, as shown in the image on the left, and the house pipes are copper after this meter.

We have decided for the time being to remain attached to the city system, and focus our efforts on recycling water through the house. Often, sustainable housing projects work towards becoming completely water independent, with a rainwater harvesting roof and cisterns, and blackwater treatment field. However, as we are modelling sustainability for an urban environment, we have decided it is more efficient to remain connected to the grid when it comes to water, and identify ways to improve the overall function of the city system.

Water Quality and Filtration System
As water is a substance that affects our personal health, we must pay attention to the quality of our tap water and crete systems for making it potable. A house system is much more sustainable than repeated trips to collect spring water, though this can be used to supplement the overall drinking water, or for persons with special water needs.

As of now we are using a zero waste, low tech water filtration system, an activated charcoal stick by *Kishu* that can be purchased in compostable packaging, and must sit in a jug of water for 2 hours before the water is potable. The charcoal stick is boiled every 2 months to clean it out, and eventually composted after it has stopped filtering effectively.

For more extensive potable water interventions, we have identified a Water Testing Company, *Tap Score* (mytapscore.com), which we will pursue to identify specific problems before taking further steps, such as installing a whole-house water filtration system.

Water Recycling

A future intervention that we have determined is both feasible, as well as worth the material, labor, and expense, is a water recycling system. As we renovate the bathrooms, and install ventilation systems to prevent future mold there, we plan to reroute greywater from the showers and sinks to an outdoor planter, which will filter the water using specific plants, then pump this water back into the toilets for use in flushing.

Stormwater & Drought Management

Providence experiences frequent rain, and we are seeing an increasing number of flash floods due to the increase in impermeable surfaces in the city and more variable weather patterns as a result of climate change. Though this is a problem that needs to be addressed on city and regional levels, we can affect our neighborhood positively by building a stormwater management garden that can absorb water on site. This land will store water for drier days as well, releasing it into the air for a more moderate and regulated microclimate overall. This project has already begun at Earthouse, and should be complete by the summer of 2019.

Rainwater Harvesting

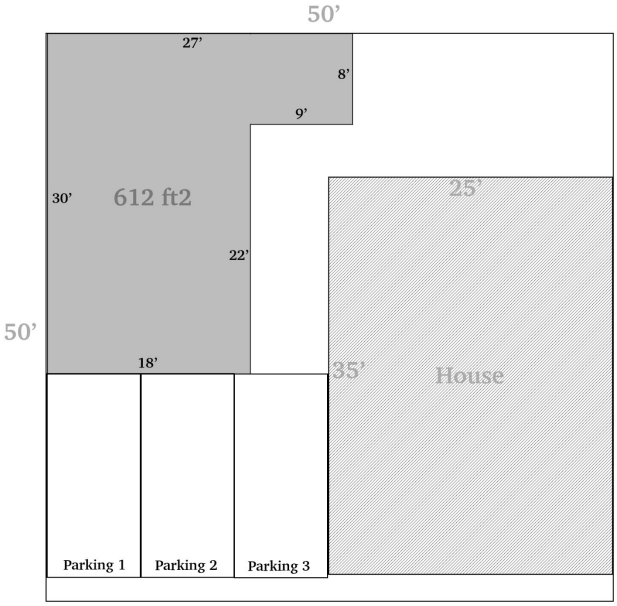
As it is a small plot, and connected to the city's supply of water and sewage treatment, we decided to keep rainwater harvesting collection and storage to a minimum, only using it for the garden and exterior of the building. We opted for a 50-gallon barrel, made from recycled plastics, which is attached to the Southeast corner of the house, closest to the garden, and brought inside during the winter to prevent freezing and damage to the barrel.

Land

Permeability

The lot size for the footprint of the whole property is *50 feet x 50 feet*. Previously, none of this was permeable, and as this is at the top of the hill relative to the rest of the neighborhood, all runoff water would leave the plot as soon as it rained.

Without the use of a larger machine, and with just handheld power tools, we have uncovered a large portion of the asphalt that used to cover the lot. The uncovered portion is 612 ft^2, which is 24% of 2500 ft^2, the total lot footprint.



Plants

A large part of our care and attention to land is expressed through our growing of plants within and outside of the house. This care extends to how we interact with the vegetative habitat beyond the house, as we teach our residents and neighbors how to manage soil and plants and give them learning opportunities that they will extend to their own plots of soil and parks. As we continue to grow our garden, we will incorporate plants that address specific needs of the site, for stormwater management, air quality management, food production, wildlife habitat and feeding, and potentially greywater management as well. This scope of activities will be achieved on a small plot through design and biointensive farming strategies.

Performance indicators and impact metrics that we will pay attention to for this portion of our development include the number and type of plants started, and the number and type of plants cared for, including mulching, pruning, and other rejuvenation of plants such as street trees, beyond our garden.

Soil Quality

In order to build a biodiverse garden, we must create the conditions for environmental abundance. Soil quality is a key aspect of this. All of our food waste is regenerated into rich soil through an on-site compost heap, shown to the left. Getting a compost heap going takes about one month. To create optimal conditions and get the compost heap to peak function, then careful attention must be paid, from the size of the scraps put in and the ratios of materials put in, to the amount of turning done.

Building natural soil health takes about 3-5 years, so if we have just uncovered this land in June of 2018, we can expect to see changes towards a more permeable, lively, and rich soil over the next couple years.

Carbon Sequestration

Carbon Sequestration is the final land management goal currently in our plan for Earthouse. As of now, we are pursuing the most low-tech, system-oriented way of approaching this problem: redirecting our mass of food scraps from landfills, where they produce greenhouse gases, to our own land, where they contribute to the growth of a fungal network and complex soil structure, eventually creating a carbon sink. In achieving carbon sequestration on site, it is important to remember that compost itself does not actively sequester carbon. Rather, the plants grown on site as a result of that rich soil are the carbon sequestration tools of our choice.

As we plant, we will begin measuring the impact of the plants we are growing, and will explore other methods to create a net positive carbon impact for the house. We have exploring small scale sequestration through a biochar-making metal log, *BioCharlie*, as an accessory to outdoor fire pits.

PART THREE: **IMPLEMENTATION**

Timeline & Finances

Affordability First and Foremost

In order to make this replicable and financially smart, I am not pursuing grants or other funding for the project. To keep my returns high which meeting my goals, my operating budget for the whole project will be $30,000. There are certain ways I spend this money then gain it back, such as with the solar panels purchase, where I will spend $12,000 up-front but gain it back in tax credit over a couple years. There will also be ways in which the cost of certain activities and systems are not counted into this $30,000, such as when a free or reduced-rent room is traded for labor and services, or as with the case of the solar panels, when a system is financed and the tenants have agreed to pay a monthly amount for the purpose of covering those payments.

Plan and Schedule

WHEN	Category	WHAT	HOW	Details	COST
July & August 2018	Interior Design	Painting hallways, bedrooms, and common spaces	Artist in residence and volunteers		$665
July & August 2018	Interior Design	Furnishing rooms	Salvaging furniture from the street and refurbishing it, building furniture out of scrap material, & buying secondhand furniture from yard sales		$170
August 2018	General Fixes	Staircase to the Basement Re-constructed	Gemini Home Improvement	The old staircase was broken and unsafe, needed complete replacement	$2,200
July-September 2018	Land	Parts of Asphalt removed with minimal tools and energy usage to make land permeable for a garden			$300
September 25-30th 2018	Land	Fence Replacement, more asphalt removal	*Medeiros Construction*, Local Contractor		$2800
September 25 2018	Energy Efficiency	RISE Energy Audit, thermostat	RISE Engineering		$1,950

		installation, and Weatherization Quote			
October 2018	Water Systems	Rainwater Harvesting barrel			*$150 (Donated to Earthouse by Devika Gupta)*
November 19th, 2018	Renewable Energy	Solar Panel Installation	Work done by Tesla's SolarCity	11.38 kw system	*$40,268, financed for $20 years with 30% down, which is covered by a federal tax credit but paid upfront within the first 18 months*
November 27-December 4, 2018	Electrical	Knob and Tube removal	Work done by Kelco Electric	Insulation cannot be installed without knob & tube wiring being changed out to Romex wiring	$11,000k
TBD	Heating, Cooling, Ventilation	Ductless Mini-splits		Alternate option is natural gas-powered Navien combi-boilers for heat & hot water*	TBD
TBD	Social Intervention/Land	"The Undercommons" basement space			$0
TBD	Water Systems	2nd and 3rd floor Bathroom renovation			$6,000
TBD	Water Systems	Water Recycling Greywater System			TBD
				TOTAL COSTS	$25,085

Changes (So Far)

As this is a research-based project, the work is never done. There are always more adaptations to be investigated, and new innovations changing the field. Design seeks to evolve with these innovations, and implementation relies on a variety of factor beyond most sustainable design, including cost, organization, availability of labor, and unforeseen conditions such as inclimate weather. The changes described below are the implementations of our study at the time of publication, a snapshot in our own evolution of structure.

Energy

Solar Power

We have installed a solar panel system that is 11.35 kW in size. This is estimated to cover about 90% of usage throughout the year for our house of 7 people, before updates of appliances and added insulation inside outer walls, taking into consideration the

Water

Rainwater Harvesting

We have invested in one rainwater barrel so far, determining that a larger cistern would be beyond the needs of this house at the moment.

Land

Permeability

We have succeeded in transforming the plot's surface area from a completely impermeable surface to a partially permeable surface. Roughly ¼ of the available surface captures water, soaking it it up into plant roots and new dirt.

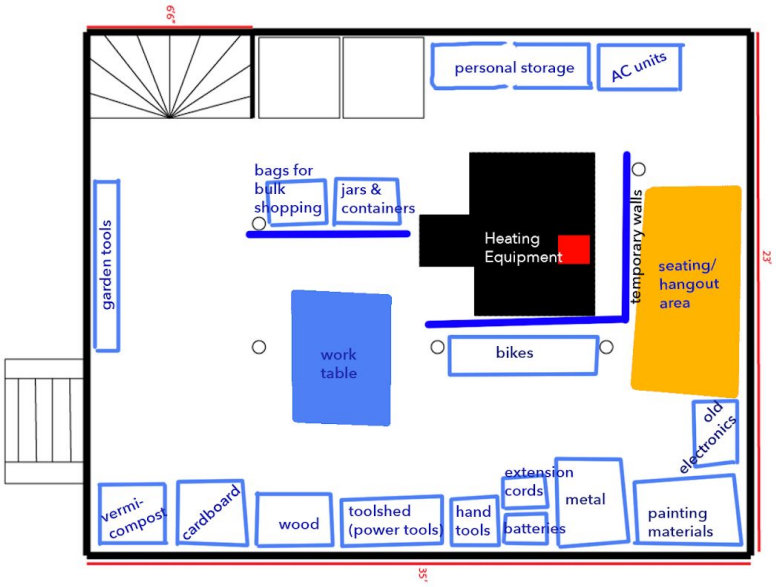
Compost

We have created an effective compost heap that our residents and neighbors can contribute to. Once the compost is processed, it is used on the garden, building up the soil. If we start producing more than we can use on site, then we will donate portions to neighbors who have gardens.

Other

Reuse Station

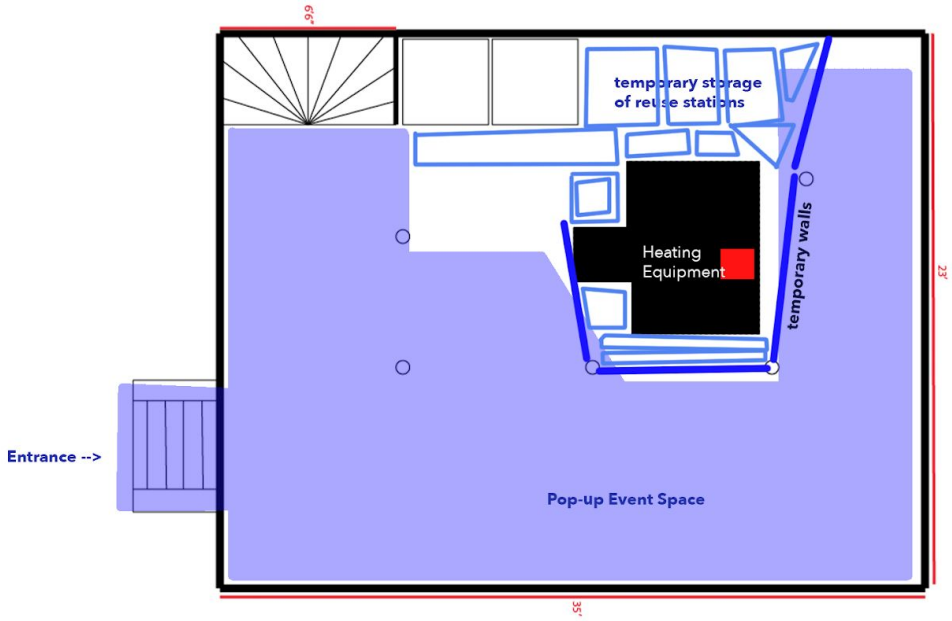
An important space that emerged out of the zero waste practices that we are trying to employ in this house was a reuse station, created in the basement. We wanted to have our own organized sorting system for materials such as glass jars and containers, screws, batteries, clothes, tools, and more. This system would allow people access to these materials on a regular



basis without cluttering the living spaces and common rooms on the 3 floors. In order to make this effective, we had to develop signage and consolidate items, making sure it stayed a reuse station and did not become a trash heap as we went along.

Pop-up Event Space

The basement and reuse stations should also be flexible enough to be reorganized for pop-up events or activities held by the residents. The separate entrance made the basement an ideal spot for such social and creative uses.



Conclusion

Reflection on Earthouse

As we have explored the reality of making changes that theoretically we had wanted to change, we learned to value the process of trade-offs, and to stress enough research and design before beginning implementation, while still learning by doing to an extent. We learned to pause before accepting the first proposed solution to a problem, and instead opt for a low-tech, low-material, alternative route that requires more thinking and perhaps more hands-on involvement and exploration on our part. We accepted that the work is not done yet, though major changes have been made to the house, and need to be made to many other buildings to achieve sustainability at scale. In order to reach the changes we need to in living infrastructure that is in harmony with the environment, we must employ a change in mentality, understanding goals rather than only technologies, so that we are more flexible and willing to use a variety of methods to achieve those goals. This diversity in means, and change in mentality, is as essential to sustainability as the impact itself.

New Target Markets

As we created this place with abundant social wealth for single students and professionals in this hip area of Providence, RI, we began to think about the changes that would be necessary to the model in order to fit the needs of single mothers, or couples, or seniors who do not live in a multi-generational household, or divorced or separated singles looking to build a new life. The goals of sustainability and collaboration are ones that can and should be implemented for many different target markets, beyond just the demographic that is usually targeted, of single, urban millennials. These varying needs would call for variations in design. For example, a house catering to seniors would need accessible design, ideally be located completely on one floor, and be close to nature yet walkable to amenities such as groceries, restaurants, and entertainment complexes. As we grow *Anamakos*, we will explore the different possibilities that these new markets afford us.

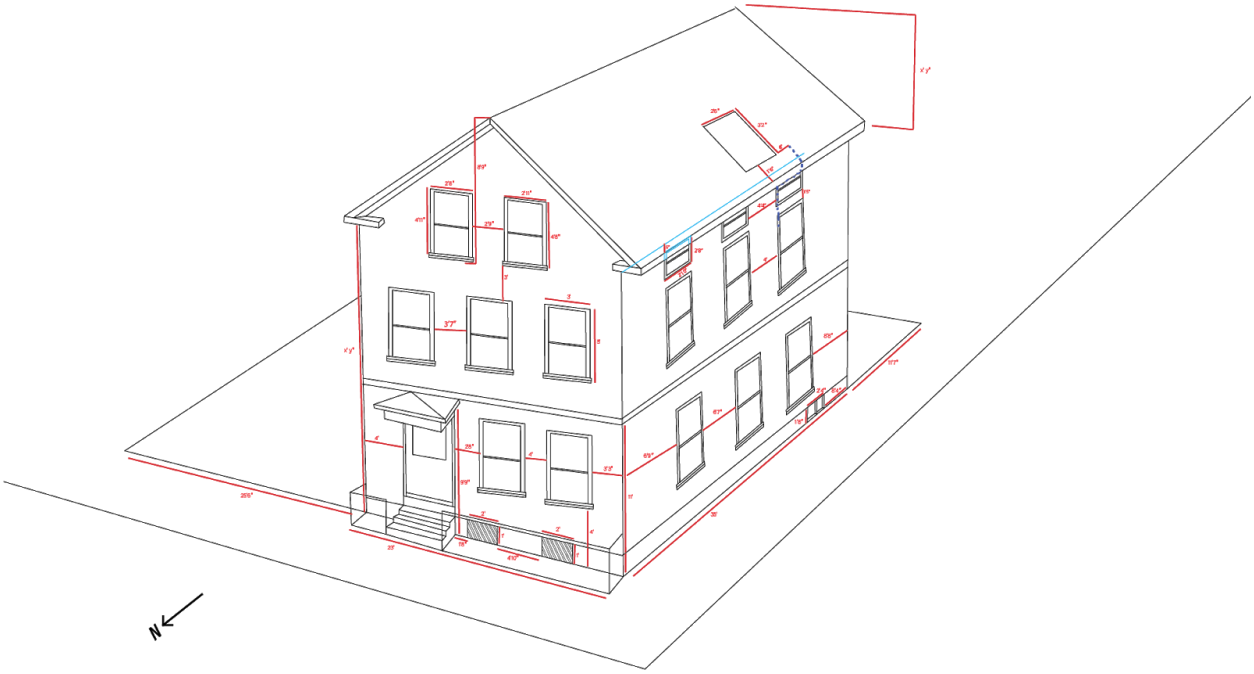
Industrial Reuse

Once *Earthouse* is established, *Anamakos* will also have the opportunity to expand its operations and apply its thinking to different parts of the landscape surrounding its properties. One such interesting opportunity is that of incorporating the ideas of reuse and adaptation beyond just housing lots into the company's approach. The Crook Point Bascule Bridge over Seekonk River, abandoned in 1976, presents the opportunity for a renewed use, perhaps through an unusual park or collaboratively run garden.

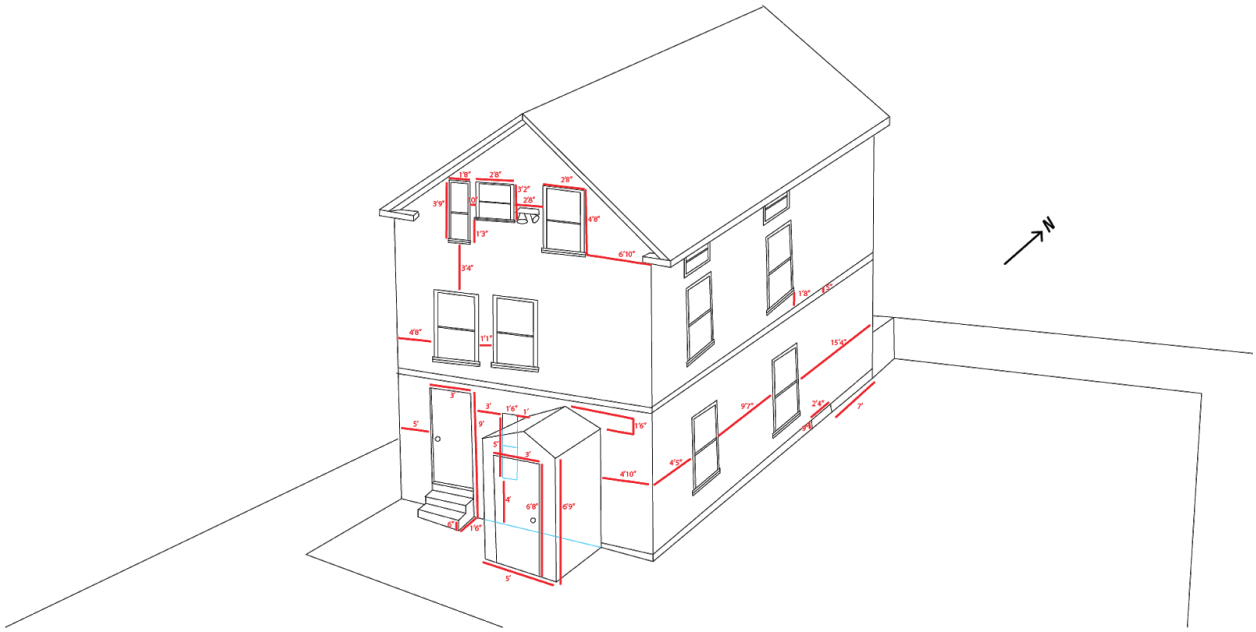
Appendix

Isometric Views & Floorplans

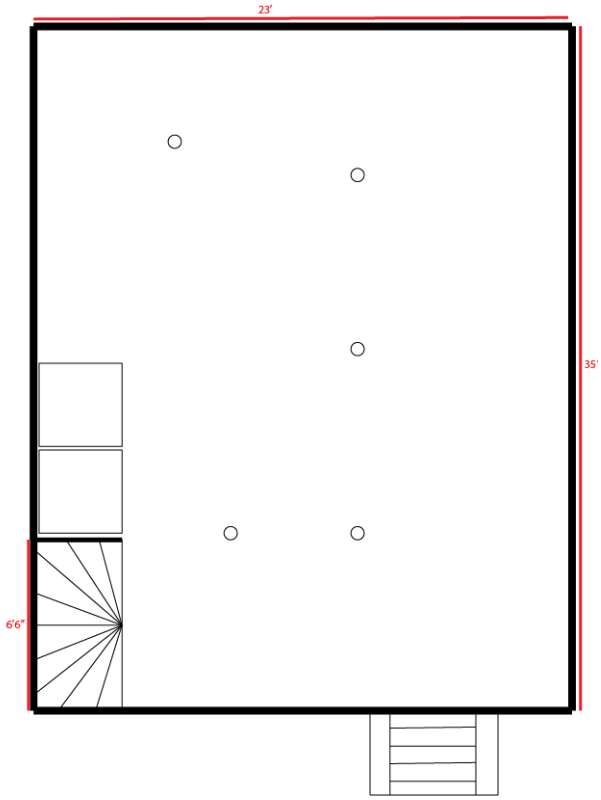
Not to Scale

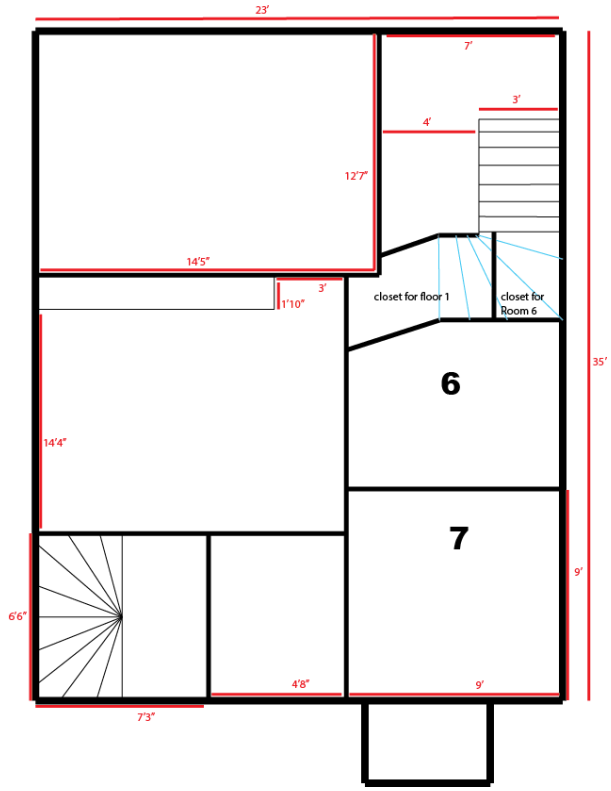


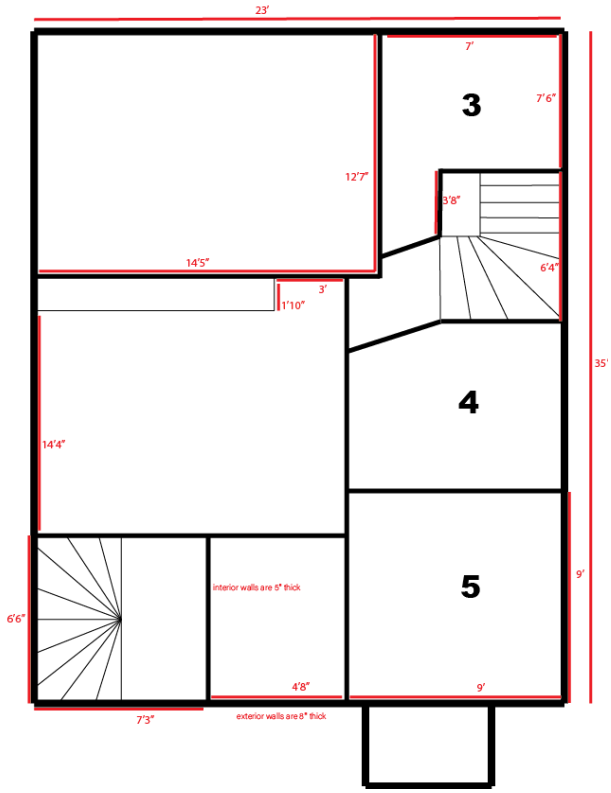
Not to Scale

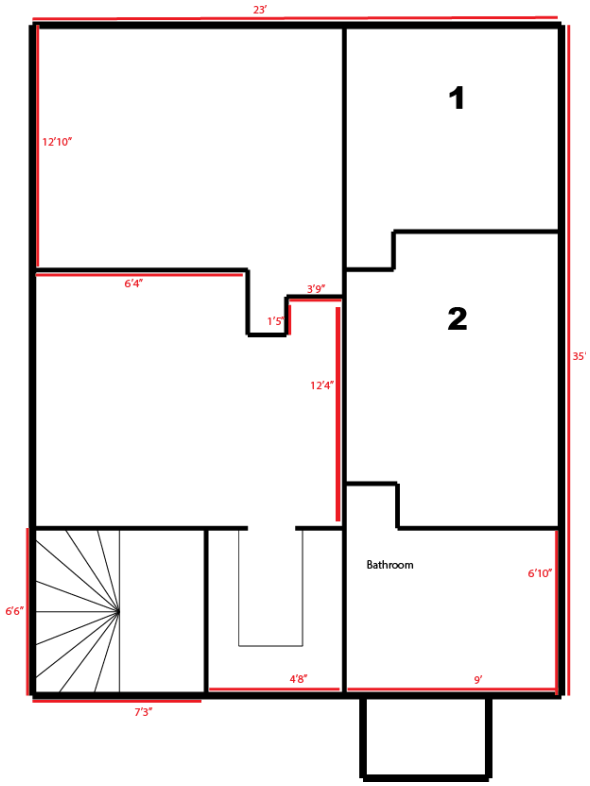


Not to Scale


23'
35'
6'6"


23'
7'
3'
4'
12'7"
14'5"
3'
1'10"
closet for floor 1
closet for Room 6
35'
6
14'4"
7
9'
6'6"
4'8"
9'
7'3"


23'
7'
3
7'6"
12'7"
3'8"
14'5"
6'4"
3'
1'10"
35'
4
14'4"
5
9'
interior walls are 8" thick
6'6"
4'8"
9'
7'3"
exterior walls are 8" thick


23'
1
12'10"
6'4"
3'9"
1'5"
2
35'
12'4"
Bathroom
6'10"
6'6"
4'8"
9'
7'3"

House Meeting Notes

Gmail by Google

Tara Gupta <tara@anamakos.com>

The official EARTHOUSE group email thread!!!

Serafima Kovalevskaya <skovalev@risd.edu> Tue, Oct 30, 2018 at 11:21 PM
To: "Roa Oliva, Mariana" <mariana_roa_oliva@brown.edu>
Cc: "Hernandez, Neidin" <neidin_hernandez@brown.edu>, Claire Harvey <charvey@alumni.risd.edu>, Andrew Kennedy <akennedy@alumni.risd.edu>, Ari Kohorn <arikohorn@gmail.com>, Tara Gupta <tara@anamakos.com>

House meeting notes:
Tuesday October 30th, 2018

attendees:
Andrew, Ari, Neidin, Claire, Serafima

1.WATER FILTRATION I brought up wanting to buy a big berkey water filtration system. Everyone present wanted to be able to have access to it to. Tara, could we get one for the house? Possibly look at other options of more robust filtration systems?

2. HOUSE CONSERN Claire and Ari brought up broken blinds on their floor and ceiling above tub is peeling in places. Holes need to be patched up to prevent mold growth.

3. RESOLUTION / ACTION talked about creating one google doc with multiple tabs what will include (trash take, cleaning, broken items/issues that need to be addressed

4. COLLABORATION Andrew is having a clean up session of the trash on the property on Saturday November 3rd. (Andrew will notify of time of day)

5. ENERGY CONSERVATION Claire reminded everyone to make sure to keep the doors to staircases closed to keep the heated air from escaping.

6. HOUSE CONCERN / ACTION Serafima brought up that there are no ventilation systems in any of the bedrooms, please make sure to keep the doors open after showering, and or open the window.

7. FEEDBACK / RESOLUTION as a group talked about the first bulk order, concluded that it did not meet most needs. Ari will get info on ordering through the Watermen Coop. other options?

I have created a google doc for house items that people want to bring up in the meetings, how those things will get addressed and when. It is a working document, so if we can adjust if need be

link to doc:
https://docs.google.com/spreadsheets/d/1fdtklMSy6ia7TddAng4Y_jqafRUlKw9QYMj7K2lwwLc/edit?usp=sharing

Please add if I missed something.

Shine on!
Good night

[Quoted text hidden]

Solar Load Calculations

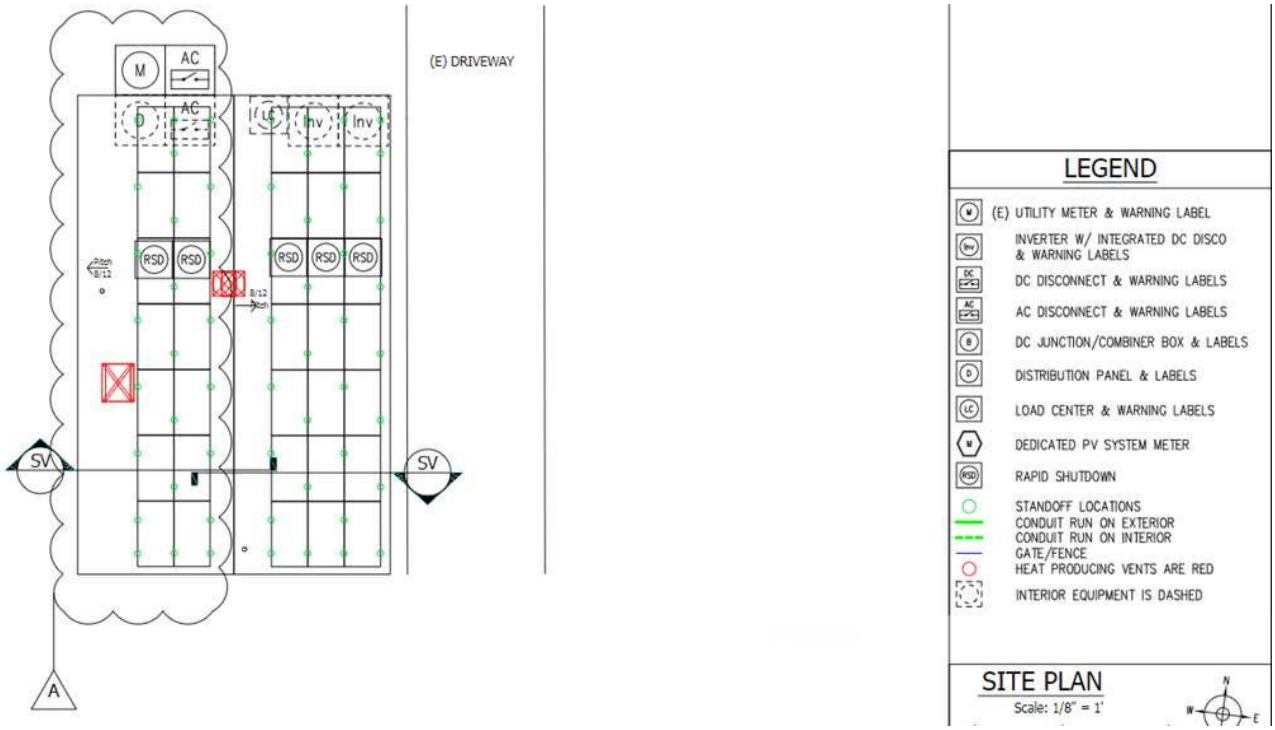
Customer information	
Customer Name	Tara Gupta
Address	1 Trenton St
Address 2	
City. State, Zip	Providence, RI, 02906
Phone	
Account #	
Installer information	
Installer contact	SolarCity
Address	3055 Clearview Way
Address 2	
City. State, Zip	San Mateo, CA 94402
Phone	650-963-5143

Seasonal Characteristics	**Maximum**
Heating Season	6 months
Air Conditioning Season	3.5 months
Utility Season	12 months

All consumption figures based on Energy Information Administration data for US Households

Load	Quantity	Monthly kWh	Months per year	Total
Kitchen				
Refridgerator w/freezer	3	56	12	2016
Freezer - Chest	0	36	12	0
Freezer - Upright	0	40	12	0
Dishwasher	0	13	12	0
Range	0	19	12	0
Oven	2	21	12	504
Microwave	0	11	12	0
Toaster oven	0	4	12	0
Coffee Maker	3	5	12	180
Garbage disposal	0	3	12	0
Well Pump 1/2 HP	0	12	12	0
Entertainment				
Stereo	0	5	12	0
TV - small (up to 19")	0	9	12	0
TV - medium (up to 27")	0	18	12	0
TV - large (greater than 27")	0	18.4	12	0
TV - 27" LCD Flat Screen	0	18	12	0
TV - 42" Plasma	0	49	12	0
VCR/DVD	0	6	12	0
Cable box	0	10	12	0
Satellite dish	0	11	12	0
Computer and printer	7	8	12	672
Lighting				
Lighting # of rooms	13	3	12	468
Outdoor lighting 175W	1	2	12	24
Outdoor lighting 250W	0	3	12	0
Laundry				
Water Heater (# of bedrooms)	0	110	12	0
Electric Dryer # of loads per week	7	3.12	12	262.08
Washing # of loads	7	1.3	12	109.2
Outdoor equipment				
Hot Tub	0	192	12	0
Pool filter / pump	0	214	3.5	0
Comfort controls				
Dehumidifier	0	100	5	0
Humidifier	0	20	3.5	0
Air Purifier	0	37	12	0
Evaporative cooler	0	296	3.5	0
Window Air Conditioner	0	90	3.5	0
Ceiling Fan	8	4	12	384
Box fan	0	11	3.5	0
Electric Blanket	0	8	5	0
Water Bed Heater	0	75	12	0
Furnace Fan	1	125	5	625
Furn 15 KW ~ 1100 sq. ft.	0	881	2	0
Furn 20 KW ~ 2000 sq. ft.	0	1762	5	0
Furn 25 KW ~ 3000 sq. ft.	0	2643	5	0
Baseboard Lin. Feet	0	30	5	0
Wall Heaters @ 2000 w	0	365	5	0
1500 W Portable	0	274	5	0
Heat pump fan	0	90	5	0
Heat pump 800-1100 sq. ft	0	1094	5	0
Heat pump 1100-2000 sq ft	1	1460	7	10220
Heat pump 2000 - 3000 sq. ft	0	1824	5	0
Air Conditioner 1/2 ton	0	375	4	0
Air Conditioner 1.5 ton	0	499	3.5	0
Air Conditioner 2 ton	0	623	3.5	0
Air Conditioner 3 ton	0	750	3.5	0
Air Conditioner 4 ton	0	1001	3.5	0
Air Conditioner 5 ton	0	1249	3.5	0
			Total	15464.28

Tesla Solar Panel System Design



RISE Engineering Proposal

DocuSign Envelope ID: 17CE92A3-CA30-401C-B47E-B68195CFE06E

RISE Engineering

1341 Elmwood Avenue, Cranston, RI 02910

401-784-3700 X-6242 FAX 401-784-3710

CONTRACT - WZ

Page 1

PROGRAM
NGRD-GAS

THIS CONTRACT IS ENTERED INTO BETWEEN RISE ENGINEERING AND THE CUSTOMER FOR WORK AS DESCRIBED BELOW

CUSTOMER	PHONE	DATE	CLIENT #	WORK ORDER
Tara Gupta	(703)346-8489	09/25/2018	259179	17802

SERVICE STREET	BILLING STREET
1 Trenton Street 3	1 Trenton Street 3

SERVICE CITY, STATE, ZIP	BILLING CITY, STATE, ZIP
Providence, RI 02906	Providence, RI 02906

DESCRIPTION	QTY	COST	INCENTIVE	TOTAL
KNOB & TUBE WIRING We have identified the existence of Knob & Tube wiring in your home. The following contract is not valid unless accompanied by the Pre-Weatherization Barrier Incentive form, signed by your licensed electrician. Work will not proceed with this work until we receive a copy of the form.			____ (initials)	
ASBESTOS HAZARD A Blower Door Test will not be conducted at your home, due to the presense of asbestos.				
ATTIC DAMMING - R-38 FIBERGLASS Provide labor and materials to install a 12" layer of R-38 unfaced fiberglass batts for damming purposes.	120	$246.00	$184.50	$61.50
ATTIC FLAT: 14" OPEN R-49 CELLULOSE Provide labor and materials to install a 14" layer of R-49 Class I Cellulose to an open attic space.	490	$882.00	$661.50	$220.50
SLOPE - 6" DENSE R-19 CELLULOSE Provide labor and materials to install 6" Class I Cellulose blown into a sloped ceiling.	385	$693.00	$519.75	$173.25
ATTIC HATCH: SEAL & INSULATE Provide labor and materials to install insulation and weatherstripping to an attic access hatch.	1	$60.00	$45.00	$15.00
VENTILATION CHUTES Provide labor and materials to install ventilation chutes in the rafter bays to maintain air flow.	35	$87.50	$65.63	$21.87
ROOF VENT 8 INCH Provide labor and materials to install an 8" diameter gray or black aluminum roof vent(s) to increase ventilation in attic areas.	2	$174.30	$130.73	$43.57
HOME AIR SEALING Provide labor and materials to Air Seal your home against wasteful, excess air leakage. Materials to be used to seal your home can include caulks, foams and other products. Primary areas for sealing include air leakage to attics, basements and other unheated areas (windows are not generally addressed.) This work includes materials and diagnostic testing. A reduction in cubic feet per minute (cfm) of air infiltration will occur, but the actual number of cfm is not guaranteed.	6	$480.00	$480.00	
WEATHERSTRIP DOOR Provide labor and materials to install Q-lon weatherstripping to	1	$58.00	$58.00	

RISE Engineering

1341 Elmwood Avenue, Cranston, RI 02910

401-784-3700 X-6242 FAX 401-784-3710

CONTRACT - WZ

PROGRAM
NGRD-GAS

THIS CONTRACT IS ENTERED INTO BETWEEN RISE ENGINEERING AND THE CUSTOMER FOR WORK AS DESCRIBED BELOW

CUSTOMER	PHONE	DATE	CLIENT #	WORK ORDER
Tara Gupta	(703)346-8489	09/25/2018	259179	17802

SERVICE STREET	BILLING STREET
1 Trenton Street 3	1 Trenton Street 3

SERVICE CITY, STATE, ZIP	BILLING CITY, STATE, ZIP
Providence, RI 02906	Providence, RI 02906

DESCRIPTION	QTY	COST	INCENTIVE	TOTAL
door(s) to restrict air leakage.				
WALL INSULATION WOOD SIDED Furnish and install blown in Class I Cellulose to shingle and/or clapboard exterior walls. The butt of the upper course of your wood siding is cut to drill holes into the wall sheathing behind. The holes are then plugged and the wood siding is reinstalled using stainless steel finish nails. Touch-up painting, if needed, will be the customer's responsibility.	590	$1,150.50	$862.88	$287.62
WALLS 3RD STORY ADDER A portion of your walls is three stories above ground level. Cost is an adjustment for work at this height.	1	$100.00	$75.00	$25.00
YOUR INCENTIVE EXPLAINED RISE Engineering has applied all applicable, eligible incentives and you will only be billed the net amount. Some measures recommended for your home qualify for an incentive from National Grid of 75% of the cost for insulation measures, not to exceed $4,000.				

Total:	**$3,931.30**
Program Incentive:	**$3,082.99**
Customer Total:	**$848.31**

WE AGREE HEREBY TO FURNISH SERVICES - COMPLETE IN ACCORDANCE WITH ABOVE SPECIFICATIONS. FOR THE SUM OF

*****Eight Hundred Forty-Eight & 31/100 Dollars** **$848.31**

UPON RECEIPT OF YOUR RISE ENGINEERING INVOICE, CUSTOMER AGREES TO REMIT AMOUNT DUE IN FULL. INTEREST OF 1% WILL BE CHARGED MONTHLY ON ANY UNPAID BALANCE AFTER 30 DAYS. SEE REVERSE FOR IMPORTANT INFORMATION ON GUARANTEES, RIGHTS OF RECISION, SCHEDULING, AND CONTRACTOR REGISTRATION.

DocuSigned by:
Charles Leach IV
8750985F497740B...
RISE REPRESENTATIVE

CUSTOMER SIGNATURE

NOTE: THIS CONTRACT MAY BE WITHDRAWN BY US IF NOT EXECUTED WITHIN 30 DAYS.

DATE OF ACCEPTANCE
SIGN DATE

ACCEPTANCE OF CONTRACT - THE ABOVE PRICES, SPECIFICATIONS AND CONDITIONS ARE SATISFACTORY TO US AND ARE HEREBY ACCEPTED. YOU ARE AUTHORIZED TO DO THE WORK AS SPECIFIED. PAYMENT WILL BE MADE AS OUTLINED ABOVE

GUARANTEES:
All materials are guaranteed by the contractor to be as specified. All work to be completed in a workmanlike manner according to standard practice. Any alteration or deviation from specifications on contract involving extra costs will be executed only upon written orders, and will become an extra charge over and above the estimate.

All agreements are contingent upon strikes, accidents, or delays beyond our control. In the event that work cannot be completed due to unforeseen existing conditions, the work will not proceed and a written agreement will be executed for the deduction of this work from the specifications on the contract.

Customer is to carry fire, tornado, and other necessary insurance. Our workers are fully covered by Workman's Compensation Insurance. Any defect in materials, manufacture, design, or installation found within one (1) year from date of the installation shall be remedied without charge and within a reasonable period of time.

SCHEDULING:
Work will begin based upon sub-contractor availability and permissible weather conditions.
We will contact you to set a date and time.

NOTICE TO MASSACHUSETTS CUSTOMERS:
The Commonwealth of Massachusetts, Board of Building Regulation and Standards requires that you be notified of the following:

"All home improvement contractors and subcontractors shall be registered and any inquiries about a contractor or subcontractor relating to a registration should be directed to:

Director, Home Improvement Contractor Registration
One Ashburton Place, Room 1301
Boston, MA 02108 Phone (617) 727-8598

Any and all necessary construction related permits are included in this contract. It shall be the obligation of the contractor to obtain such permits as the customer's agent. Customers who secure their own construction-related permits or deal with unregistered contractors will be excluded from access to the guaranty fund."

NOTICE TO BUYER:

1. You are entitled to a copy of this agreement at the time you sign it.

2. The seller has no right to enter unlawfully your premises or commit any breach of the peace to repossess goods purchased under this agreement.

3. You may cancel this agreement if it has not been signed at the Main Office or a Branch Office of the Seller provided you notify the Seller at his Main Office or Branch Office shown in the agreement by registered or certified mail, which shall be posted not later than midnight of the third calendar day after the day on which the Buyer signs the agreement, excluding Sunday and any Holiday on which regular mail deliveries are not made.

4. No lien or security interest is placed on the property as a consequence of this contract if payment is made in accordance with contract terms.

Printed: 9/25/2018 10:54:46 AM

RISE Engineering

1341 Elmwood Avenue, Cranston, RI 02910

401-784-3700 X-6242 FAX 401-784-3710

CONTRACT -

Page 1

PROGRAM
NGRD-GAS

THIS CONTRACT IS ENTERED INTO BETWEEN RISE ENGINEERING AND THE CUSTOMER FOR WORK AS DESCRIBED BELOW

CUSTOMER	PHONE	DATE	CLIENT #	WORK ORDER
Tara Gupta	(703)346-8489	09/25/2018	259178	17802

SERVICE STREET	BILLING STREET
1 Trenton Street 2	1 Trenton Street 2

SERVICE CITY, STATE, ZIP	BILLING CITY, STATE, ZIP
Providence, RI 02906	Providence, RI 02906

DESCRIPTION	QTY	COST	INCENTIVE	TOTAL
KNOB & TUBE WIRING We have identified the existence of Knob & Tube wiring in your home. The following contract is not valid unless accompanied by the Pre-Weatherization Barrier Incentive form, signed by your licensed electrician. Work will not proceed with this work until we receive a copy of the form.			_____ (initials)	
ASBESTOS HAZARD A Blower Door Test will not be conducted at your home, due to the presense of asbestos.				
WEATHERSTRIP DOOR Provide labor and materials to install Q-lon weatherstripping to door(s) to restrict air leakage.	2	$116.00	$116.00	
WALL INSULATION WOOD SIDED Furnish and install blown in Class I Cellulose to shingle and/or clapboard exterior walls. The butt of the upper course of your wood siding is cut to drill holes into the wall sheathing behind. The holes are then plugged and the wood siding is reinstalled using stainless steel finish nails. Touch-up painting, if needed, will be the customer's responsibility.	1,032	$2,012.40	$1,509.30	$503.10

RISE Engineering

1341 Elmwood Avenue, Cranston, RI 02910
401-784-3700 X-6242 FAX 401-784-3710

CONTRACT -

Page 2

PROGRAM
NGRD-GAS

THIS CONTRACT IS ENTERED INTO BETWEEN RISE ENGINEERING AND THE CUSTOMER FOR WORK AS DESCRIBED BELOW

CUSTOMER	PHONE	DATE	CLIENT #	WORK ORDER
Tara Gupta	(703)346-8489	09/25/2018	259178	17802

SERVICE STREET	BILLING STREET
1 Trenton Street 2	1 Trenton Street 2

SERVICE CITY, STATE, ZIP	BILLING CITY, STATE, ZIP
Providence, RI 02906	Providence, RI 02906

DESCRIPTION	QTY	COST	INCENTIVE	TOTAL
YOUR INCENTIVE EXPLAINED RISE Engineering has applied all applicable, eligible incentives and you will only be billed the net amount. Some measures recommended for your home qualify for an incentive from National Grid of 75% of the cost for insulation measures, not to exceed $4,000.				

Total:	**$2,128.40**
Program Incentive:	**$1,625.30**
Customer Total:	**$503.10**

WE AGREE HEREBY TO FURNISH SERVICES - COMPLETE IN ACCORDANCE WITH ABOVE SPECIFICATIONS. FOR THE SUM OF

*****Five Hundred Three & 10/100 Dollars** **$503.10**

UPON RECEIPT OF YOUR RISE ENGINEERING INVOICE, CUSTOMER AGREES TO REMIT AMOUNT DUE IN FULL. INTEREST OF 1% WILL BE CHARGED MONTHLY ON ANY UNPAID BALANCE AFTER 30 DAYS. SEE REVERSE FOR IMPORTANT INFORMATION ON GUARANTEES, RIGHTS OF RECISION, SCHEDULING, AND CONTRACTOR REGISTRATION.

DocuSigned by:
Charles Leach IV
87509B5F4077409...
RISE REPRESENTATIVE

CUSTOMER SIGNATURE

NOTE: THIS CONTRACT MAY BE WITHDRAWN BY US IF NOT EXECUTED WITHIN 30 DAYS.

DATE OF ACCEPTANCE
SIGN DATE

ACCEPTANCE OF CONTRACT - THE ABOVE PRICES, SPECIFICATIONS AND CONDITIONS ARE SATISFACTORY TO US AND ARE HEREBY ACCEPTED. YOU ARE AUTHORIZED TO DO THE WORK AS SPECIFIED. PAYMENT WILL BE MADE AS OUTLINED ABOVE

\

RISE Engineering

1341 Elmwood Avenue, Cranston, RI 02910

401-784-3700 X-6242 FAX 401-784-3710

CONTRACT

Page 1

PROGRAM
NGRD-GAS

THIS CONTRACT IS ENTERED INTO BETWEEN RISE ENGINEERING AND THE CUSTOMER FOR WORK AS DESCRIBED BELOW

CUSTOMER	PHONE	DATE	CLIENT #	WORK ORDER
Tara Gupta	(703)346-8489	09/25/2018	259177	17802

SERVICE STREET	BILLING STREET
1 Trenton Street 1	1 Trenton Street 1

SERVICE CITY, STATE, ZIP	BILLING CITY, STATE, ZIP
Providence, RI 02906	Providence, RI 02906

DESCRIPTION	QTY	COST	INCENTIVE	TOTAL
KNOB & TUBE WIRING We have identified the existence of Knob & Tube wiring in your home. The following contract is not valid unless accompanied by the Pre-Weatherization Barrier Incentive form, signed by your licensed electrician. Work will not proceed with this work until we receive a copy of the form.			_____ (initials)	
ASBESTOS HAZARD A Blower Door Test will not be conducted at your home, due to the presense of asbestos.				
HOME AIR SEALING Provide labor and materials to Air Seal your home against wasteful, excess air leakage. Materials to be used to seal your home can include caulks, foams and other products. Primary areas for sealing include air leakage to attics, basements and other unheated areas (windows are not generally addressed.) This work includes materials and diagnostic testing. A reduction in cubic feet per minute (cfm) of air infiltration will occur, but the actual number of cfm is not guaranteed.	4	$320.00	$320.00	
WEATHERSTRIP DOOR Provide labor and materials to install Q-lon weatherstripping to door(s) to restrict air leakage.	4	$232.00	$232.00	
WALL INSULATION WOOD SIDED Furnish and install blown in Class I Cellulose to shingle and/or clapboard exterior walls. The butt of the upper course of your wood siding is cut to drill holes into the wall sheathing behind. The holes are then plugged and the wood siding is reinstalled using stainless steel finish nails. Touch-up painting, if needed, will be the customer's responsibility.	1,032	$2,012.40	$1,509.30	$503.10
BASEMENT SILLS RIGID BOARD INSULATION Provide labor and materials to install (118) linear feet of rigid board insulation to the perimeter of the basement ceiling at the house sill.	118	$454.30	$340.73	$113.57

RISE Engineering

1341 Elmwood Avenue, Cranston, RI 02910

401-784-3700 X-6242 FAX 401-784-3710

CONTRACT

Page 2

PROGRAM
NGRD-GAS

THIS CONTRACT IS ENTERED INTO BETWEEN RISE ENGINEERING AND THE CUSTOMER FOR WORK AS DESCRIBED BELOW

CUSTOMER	PHONE	DATE	CLIENT #	WORK ORDER
Tara Gupta	(703)346-8489	09/25/2018	259177	17802

SERVICE STREET	BILLING STREET
1 Trenton Street 1	1 Trenton Street 1

SERVICE CITY, STATE, ZIP	BILLING CITY, STATE, ZIP
Providence, RI 02906	Providence, RI 02906

DESCRIPTION	QTY	COST	INCENTIVE	TOTAL
YOUR INCENTIVE EXPLAINED RISE Engineering has applied all applicable, eligible incentives and you will only be billed the net amount. Some measures recommended for your home qualify for an incentive from National Grid of 75% of the cost for insulation measures, not to exceed $4,000.				

Total:	**$3,018.70**
Program Incentive:	**$2,402.03**
Customer Total:	**$616.67**

WE AGREE HEREBY TO FURNISH SERVICES - COMPLETE IN ACCORDANCE WITH ABOVE SPECIFICATIONS. FOR THE SUM OF

*****Six Hundred Sixteen & 67/100 Dollars** **$616.67**

UPON RECEIPT OF YOUR RISE ENGINEERING INVOICE, CUSTOMER AGREES TO REMIT AMOUNT DUE IN FULL. INTEREST OF 1% WILL BE CHARGED MONTHLY ON ANY UNPAID BALANCE AFTER 30 DAYS. SEE REVERSE FOR IMPORTANT INFORMATION ON GUARANTEES, RIGHTS OF RECISION, SCHEDULING, AND CONTRACTOR REGISTRATION.

DocuSigned by:
Charles Leach IV
8750985F497740B...
RISE REPRESENTATIVE

CUSTOMER SIGNATURE

NOTE: THIS CONTRACT MAY BE WITHDRAWN BY US IF NOT EXECUTED WITHIN 30 DAYS.

DATE OF ACCEPTANCE
SIGN DATE

ACCEPTANCE OF CONTRACT - THE ABOVE PRICES, SPECIFICATIONS AND CONDITIONS ARE SATISFACTORY TO US AND ARE HEREBY ACCEPTED. YOU ARE AUTHORIZED TO DO THE WORK AS SPECIFIED. PAYMENT WILL BE MADE AS OUTLINED ABOVE