



NC GROWING TOGETHER

*Connecting Local Foods
to Mainstream Markets*

ON - FARM INFRASTRUCTURE TOOLKIT

Early Release

The NC Growing Together project has teamed up with the Carolina Farm Stewardship Association to develop an On-Farm Infrastructure Toolkit to provide small-scale, limited-resource fruit and vegetable producers with the information they need to build scale appropriate postharvest handling facilities. The complete toolkit will be released in March. However, due to grant and loan funding cycles, we wanted to provide producers with information on postharvest handling and washing requirements, construction materials and cost list, and funding opportunities.



United States Department of Agriculture
National Institute of Food and Agriculture

This project is supported by the Agriculture and Food Research Initiative competitive grant no. 2013-68004-20363 of the USDA National Institute of Food and Agriculture. Any opinions, findings, recommendations or conclusions are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture.

carolina farm 
stewardship association

CHAPTER 1: POSTHARVEST COOLING & WASHING

INTRODUCTION

Postharvest cooling is the process of removing field heat and preparing crops for cold storage. Postharvest cooling is vital for extending the shelf life of produce (Slama and Diffley, 2013). Postharvest cooling should not be confused with longer-term cold storage, which will be discussed later in Chapter 3.

Postharvest cooling methods include forced-air, hydro-cooling, vacuum cooling, water spray vacuum, ice, and room cooling. Vacuum and water spray vacuum cooling are expensive and not economically feasible for small-scale fruit and vegetable producers, therefore, they are not covered in this toolkit. However, the concepts used in forced-air, hydro-cooling, ice, and room cooling can be incorporated into cost effective designs applicable to small-scale operations. An overview of each method is discussed in this chapter.

Forced-air Cooling

Forced-air cooling consists of pushing or pulling chilled air through stacked containers of produce so that it contacts individual pieces of product. Forced-air cooling is commonly used for tree fruits, berries, melons, and cut flowers. Most commodities can be cooled using forced air, and this process does not require water-resistant packaging. However, disadvantages of forced-air cooling are that it is slower than other methods of cooling (except room cooling), it requires special packaging that promotes air-flow across the product, and it can lead to excessive water loss in some crops (Thompson 2002).

Hydro-cooling

Hydro-cooling is achieved using either water shower or product immersion systems. Hydro-cooling is typically used for leafy vegetables as an alternative to vacuum or water spray vacuum cooling methods. Hydro-cooling water should be kept as cold as possible, be free of decay-causing contamination, and come in contact with as much of the produce's surface as possible (Thomson 2002). It is important that crops be clean prior to hydro-cooling and that hydro-cooling water be replaced frequently enough to maintain proper sanitation (food safety aspects of hydro-cooling are detailed later in this toolkit). Mechanized hydro-cooling systems may be cost prohibitive for small-scale producers, but some benefits of hydro-cooling can be achieved by simply immersing suitable crops in tubs of ice water (see Table 1).

Example hydro-cooling containers include 18-gallon plastic totes found at hardware stores and 50-gallon stock or utility tanks available at farm supply stores. Modifications can be made to these containers, such as the installation of float valves so that filling does not have to be supervised, and (re)location of drains so that the tanks can be completely drained.

Ice Cooling or Package Icing

Commercial ice making equipment requires a large investment that is likely beyond the financial means of small-scale producers. However, package icing (filling containers packed with produce with crushed ice) can be an effective method to quickly cool product and maintain humidity so that moisture loss is minimized. Proper cooling typically requires product to come into contact with ice; therefore, water-resistant packaging must be used. While not a standalone method of postharvest cooling, access to ice should be considered for use in hydro-cooling and/or top icing (topping off packed containers with loose ice) certain crops during transport.

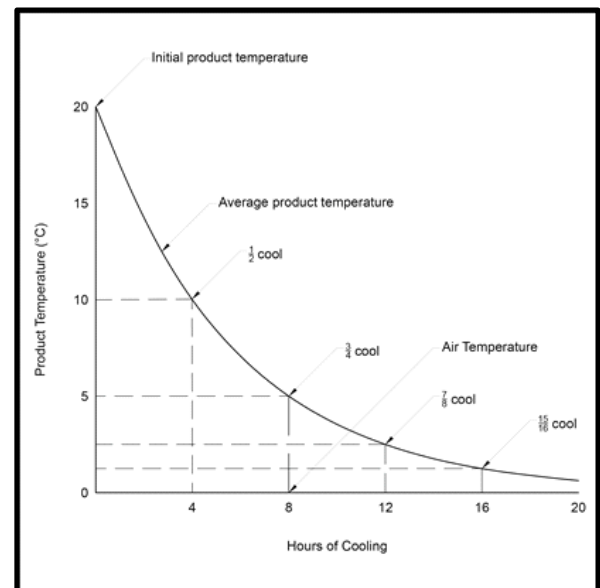
Room Cooling

Room cooling consists of exposing harvested crops to a refrigerated environment. The advantages of room cooling are that facility design and operation are relatively simple, crops cooled and stored at similar temperatures require less handling, and there is no need for the type of expensive cooling equipment that is found in more rapid cooling methods. The time required to cool crops using room cooling is longer compared to other postharvest cooling methods and this represents a significant disadvantage, especially when the rate of decay of certain products is greater than the cooling time (Thompson 2002; also see Table 1). Room cooling is different from forced-air cooling since air is not intentionally pushed or pulled through containers of produce. Room cooling should be considered a temporary step in postharvest cooling to remove field heat prior to postharvest washing and not a substitute for long-term cold storage. It is a common strategy to quickly remove field heat with forced air or hydro cooling (depending on the product, see Table 1), with room cooling used for storage before or after washing and packing. More information on cold-storage and cooler design will be discussed in Chapter 3.

Concept of Cooling Time

Deciding which postharvest cooling method is appropriate for one's operation ultimately depends upon the costs of installation and operation/maintenance. Other important factors to consider are the speed and efficiency of cooling, and the "half cooling time" per product. The half cooling time is the amount of time elapsed between a product's field temperature and ideal holding temperature divided by two (Figure 1). A general rule of thumb is that produce should be precooled for 7/8 (87.5%) of the time it takes to reach its ideal holding temperature, at which time it should be placed in cold storage (Slama and Diffley 2013). You can quickly calculate 7/8 cooling time by multiplying half cooling time by three. Knowing 7/8 cooling time is essential for evaluating whether or not a postharvest cooling method is sufficient to achieve the desired shelf life of a product. For example, it takes about four hours for large tree fruits to reach half cooling, therefore, 7/8 cooled is approximately 12 hours (Kadar 2002). Cooling methods and time vary depending on the crop type and method used (Figure 1).

Figure 1. Typical Cooling Time for Perishable Products



From Kadar, Adel A. *Postharvest Technology of Horticultural Crops*, 3rd Edition. Agriculture and Natural Resources Publication 3311, University of California, 2002

Table 1. Comparison of Cooling Methods for Common Fruits and Vegetables on Small-scale Farms¹

| Method | Room Cooling | Forced-air Cooling | Hydro-cooling | Ice Cooling | Ideal Holding Temperature (°F) ² |
|----------------------|--------------|--------------------|---------------|-------------|---|
| Cooling Time (hours) | 20-100 | 1-10 | 0.1-1 | 0.1-0.3 | |
| Apples | X | X | X | | 30-31; 38-40 ³ |
| Asparagus | | | X | X | 32 (36) ⁴ |
| Beans | X | X | X | | 41-43 |
| Beets, roots | X | | | | 32 |
| Blackberries | X | X | | | 31-32 |
| Blueberries | X | X | | | 31-32 |
| Broccoli | | X | X | X | 32 |
| Brussels sprouts | | | X | X | 32 |
| Cabbage | X | X | | | 32 |
| Carrots, topped | X | | | X | 32 |
| Cauliflower | | | X | | 32 |
| Celery | | | | X | 32 |
| Corn, sweet | | | X | X | 32 |
| Cucumbers | | X | X | | 50-55 |
| Eggplant | X | X | | | 50-54 |
| Endive | | | X | X | 32 |
| Leafy greens | | | X | X | 32-36 |
| Leeks | | | X | X | 32 |
| Lettuce, head | | | X | X | 32 |
| Onions, green | | | X | X | 32 |
| Parsley | | | X | X | 32 |
| Pear | X | X | X | | 29-31 |
| Peas | | X | X | X | 32-34 |
| Peppers | X | X | | | 45-50 |
| Potatoes | X | X | | | 50-59; 40-55 ⁵ |
| Radishes | | | X | X | 32 |
| Raspberries | X | X | | | 31-32 |
| Rutabagas | X | | | | 32 |
| Spinach | | | X | X | 32 |
| Squash, summer | X | X | | | 45-50 |
| Strawberries | X | X | | | 32 |
| Tomatoes | X | X | | | 50-55; 45-50 ⁶ |
| Turnips | X | | X | X | 32 |

¹ Adapted from Slama, Jim and Diffley, Atina. Wholesale Success: A Farmer's Guide to Food Safety, Selling, Postharvest Handling, and Packing Produce, Fourth Edition, FamilyFarmed, 2013.

² Thompson, James F., et al. Appendix A-1, Commercial Cooling of Fruits, Vegetables, and Flowers, Revised Edition, Agriculture and Natural Resources Publication 21567, University of California, 2002.

³ Apples, nonchilling sensitive varieties 30-31°F; chilling sensitive varieties 38-40°F

⁴ Chilling injury may occur if held below temperature in parenthesis

⁵ 50-59°F for early, immature potatoes; 40-55°F for late, mature potatoes

⁶ 50-55°F for mature green tomatoes; 45-50°F for firm ripe tomatoes

Postharvest Washing

The potential for produce to contact contaminants exists each time it is handled. Reducing the need for postharvest washing minimizes the potential exposure to contamination while minimizing labor costs. Possible ways to reduce the need for washing include the use of mulch and drip irrigation to reduce the occurrence of water splashing dirt on produce. Making sure that harvest tools and picking containers are clean and that workers maintain proper hygiene can also reduce the need for postharvest washing. If cleaning is required, there are low-cost options; however, different crops will have different washing and drying requirements (Table 2).

In cooperation with One Step at a Time Gardens, the Leopold Center designed and published construction details for two washing stations. [Vegetable Wash Station Design 1](#) is adequate for most small-scale operations and can be constructed for about \$1,000 in materials. New Entry Sustainable Farming Project modified the design and materials so that the washing station can be certified for Good Agricultural Practices (GAPs) operations. Those modifications and a materials cost list can be found at: http://nesfp.org/sites/default/files/resources/og_wash_station_notes_pdf_version.pdf. See the attachment for a detailed construction plans for the Vegetable Wash Station, including a materials list and approximate costs.

Figure 2. The Leopold Center Vegetable Wash Station Design 1

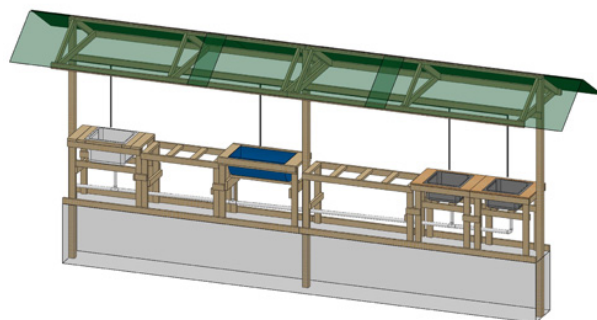


Table 2. Cleaning Options and Drying Considerations for Common Crops¹

| Crop | Cleaning Options for Small-Scale Farms | Dry Considerations |
|---------------------------------------|---|---|
| Baby Salad Greens | Double-wash/rinse in a water tank; after drying, remove sticks, weeds, and bad leaves | Spin dry |
| | Wash in a baby greens washing/cooling pack line | Spin dry |
| Beans and Peas | Field pack if clean and cool or if they can be cooled quickly | Picked dry |
| | Avoid washing if possible; if necessary, batch wash in harvest tote in water tank; 2 nd tank rinse | If washing is needed, lay on screen table to air dry; fluff with fingers; do not allow to heat up |
| Berries | Do not wash | Not applicable |
| Bok Choy | Tank wash with sanitizer | Drain upside down on screen table |
| Broccoli, Cauliflower, Cabbage | Harvest clean and pack without further cleaning | None required |
| | Broccoli and cauliflower can be cleaned in a tank with water and sanitizer | None required |
| | Cabbage should not be immersed in water; if soiled, trim soiled areas with knife; if washing is necessary, spray soiled areas lightly | Air dry |
| Cantaloupe or Muskmelon | If it is not muddy, dry brush at harvest with glove or cloth | Not applicable |
| | Spray wash in harvest; do not immerse in water | Air dry |
| | Mechanical brush washer | Pack line absorber unit or air dry |
| Celery | Spray wash | Dry upside down |
| Bulk Roots and Tubers | Hand method; spray wash on screen table or in harvest tote | Air dry |
| | Mechanical brush washer is generally best for round vegetables or long rooted crops | Pack line absorber unit |
| Green-top Bunched Roots | Spray wash on drain table; pressure washer can be used on roots; washer can be used with care on roots only | None required, can be packed wet |
| Head Lettuce | Field pack if lettuce is clean and cool or if it is clean and can be cooled quickly | None required |
| | If very dirty, gently spray off the bulk of the soil; wash in water tank; 2 nd tank rinse | Drain upside down on screen table |
| Bunched Herbs | Field pack if clean and cool | None required |
| | If bunched herbs need to be cooled and or cleaned, tank wash in sanitizer water; if basil, keep water above 55° F | Drain upside down on screen table |
| Onions, Garlic, Shallots | Trim roots and tops and spray wash for fresh market | Air dry excess moisture |
| | For storage, cut tops and dry brush after curing | None required |
| Peppers, Cucumbers | Dry brush with clean glove or cloth at harvest and field pack | None required |
| | Hand-brush wash in water tank | Air dry while packing |

| Crop | Cleaning Options for Small-Scale Farms | Dry Considerations |
|--------------------------------|--|------------------------------------|
| | Wet-brush in pack line | Pack line absorber unit or air dry |
| | Jacuzzi water bath (peppers) | Air/drain dry while packing |
| Sweet Corn | Pick clean; no washing needed | None required |
| Tomatoes | Dry brush with clean glove or cloth at harvest and field pack | None required |
| | Washing is not recommended; do not immerse in water; if washing is necessary, clean by hand with a wet cloth or in a mechanical pack line using soft brushes | Pack line absorber unit or air dry |
| Watermelons | Wipe off dirt at harvest | None required |
| | Wet brush by hand or machine if more washing is needed | Pack line absorber unit or air dry |
| Winter Squash, Pumpkins | Wipe off dirt at harvest; wet brush by hand or machine if dirty | Pack line absorber unit or air dry |
| Zucchini, Summer Squash | Dry brush with clean glove or cloth at harvest and field pack | None required |
| | Washing is not recommended; if washing is necessary, clean by hand or in a mechanical pack line using soft brushes | Pack line absorber unit or air dry |

¹ Adapted from Slama, Jim and Diffley, Atina. Wholesale Success: A Farmer's Guide to Food Safety, Selling, Postharvest Handling, and Packing Produce, Fourth Edition, FamilyFarmed, 2013.

Considerations for Certified Organic Farmers

For certified organic operations, lumber treated with arsenate or other prohibited substances that might contact crops, soil or livestock is not allowed. Alternatives to lumber treated with prohibited substances include metal poles/supports, untreated lumber, and lumber treated with allowed substances. Well-designed wash stations should eliminate contact between produce and wood surfaces and surfaces that cannot be sanitized, which is essential for GAPs certification. Alternatives to wood include metal, "plastic" wood (Trex), and plastic screen or netting. As with any organic certification question, be sure to contact your organic certifier for approval to use materials prior to construction.

Case Study: Elma C. Lomax Incubator Farm

Farm Profile

The Elma C. Lomax Incubator Farm is a certified organic incubator farm located in Concord, NC. "Lomax" is a training-ground where beginning farmers can gain access to land and equipment to start their own farm business. The farm is roughly 30 acres with about 10 acres in production, which is split between nine different farmers-in-training. At the farm, vegetable production occurs year round.

Post-harvest Washing and Cooling Infrastructure:

The postharvest washing and cooling station is centrally located on the farm and housed underneath an open pole barn structure. The farm's cold storage facility adjoins the post-harvest washing and cooling station, which is ideal for preserving produce quality.

Components of the post-harvest washing and cooling station include:

- (3) triple basin stainless steel sinks
- (4) 24"x70" stainless steel tables
- ice machine
- 1,600 cubic foot walk-in cooler (10'x20'x8')
- multiple ice chests
- large commercial salad spinner

Station Layout

All of the triple basin stainless steel sinks are lined up together along with a stainless steel table on one side of the postharvest bay of an open pole barn (Photo 1). Opposite of the sinks are the remaining stainless steel tables, lined up side-by-side, and the ice machine. Directly behind the row of stainless steel tables and ice machine is the walk-in cooler, which is located in the central bay of the pole barn. Shielding coolers and ice machines from direct sunlight is important when designing postharvest washing and cooling structures.



Photo 1. Lomax Postharvest Washing Stations
(Photo by Thomas Moore)

Best Practice

The postharvest washing and cooling station is designed for optimal throughput of produce from field to the cooler. Dirty produce can enter the station from one end and leave clean from another end without much concern for cross contamination. The ice machine is an added benefit to the farmers and used on produce for which top icing is appropriate (the farm does not have hydro cooling facilities).

Obstacles and Challenges

The main challenge with the postharvest washing and cooling station at Lomax is that it is shared by so many farmers and it can reach capacity fairly quickly during peak harvest time. Additionally, insuring that every farmer keeps the stations clean and free of debris can sometimes be challenging, especially since the stations are outdoors.

During the winter months, if the water pipes aren't drained daily they run the risk of breaking from the water freezing inside of them. Every year the farm manager at Lomax can anticipate repairing broken pipes due to freezing at least once or twice during winter months.

CHAPTER 4: FUNDING SOURCES

INTRODUCTION

Access to capital is one of the biggest barriers that small-scale farmers face when trying to expand or enhance their farm's operational output. This chapter describes loan programs and grant opportunities that are available to farmers and ranchers looking to make capital improvements to their business, specifically regarding improvements to post-harvest handling facilities.

GRANTS

NC Tobacco Trust Fund Commission

The NC Tobacco Trust Fund Commission (TTFC) offers small grants managed by different organizations/institutions to assist with projects that can help with infrastructure investments. *Grants are specific to various regions, and farmers must contact specific grantors to begin the application process.*

2015 Cost-Share Program Partners: May still have funding available.

NC AgVentures

Description: The funds will be used for cost-share grants to enhance farming operations.

Area Served: Piedmont and Coastal Plain counties

For more information: www.agventures.ces.ncsu.edu

Agricultural Reinvestment Fund

Description: The project will provide cost-share grants to farmers in specific counties for innovative projects designed to increase farm income and build markets for NC agricultural products. Priority is given to current and former tobacco farmers.

Area Served: Select NC Counties in Eastern NC

For more information: www.rafiusa.org

Investing in NC Agriculture Opportunities

Description: The grantee will work with representatives in specific counties to fund innovative cost-share projects which support agricultural profitability and productivity.

Area Served: Select NC Counties

For more information: www.umoag.com

2016-17 Cost-Share Program Partners

Energy Conservation Program (E-CAP)

Description: Cost-share assistance to WNC farmers for energy efficiency or renewable energy projects that increase agricultural output and/or decrease energy costs. Project examples include solar-PV electricity for cold storage rooms, insulating processing rooms and greenhouses, and more.

Area Served: Alexander, Allegheny, Ashe, Avery, Buncombe, Burke, Caldwell, Catawba, Cherokee, Clay, Cleveland, Graham, Haywood, Henderson, Iredell, Jackson, Lincoln, Macon, Madison, McDowell, Mitchell, Polk, Rutherford, Swain, Transylvania, Watauga, Wilkes, Yancey

For more information: www.mountainvalleysrcd.org

NC AgVentures Grant Program

Description: Cost-share grants to benefit farming operations and increase farm profits.

Area Served: Yadkin, Surry, Rockingham, Stokes, Guilford, Forsyth, Pitt, Nash, Edgecombe, Wilson, Martin, Johnston, Wayne, Greene, Sampson

For more Information: www.go.ncsu.edu/agfoundation

Agricultural Reinvestment Fund

Description: Cost-share grants to farmers in NC for innovative projects designed to increase farm income and build markets for NC agricultural products.

Area Served: Randolph, Chatham, Alamance, Caswell, Cumberland, Davidson, Davie, Person, Orange, Durham, Granville, Guilford, Vance, Warren, Franklin, Halifax, Northampton, Hertford, Bertie, Chowan

For more information: www.rafiusa.org

WNC Agricultural Options Program (a.k.a., WNC AgOptions)

Description: Demonstration grants that help family farmers in Western NC diversify and expand their farming operations and replace tobacco-based income.

Area Served: Avery, Burke, Cherokee, Cleveland, Haywood, Jackson, Madison, Mitchell, Eastern Band of Cherokee Indians, Swain, Watauga, Buncombe, Caldwell, Clay, Graham, Henderson, Macon, McDowell, Polk, Rutherford, Transylvania, Yancey

For more information: www.wnccommunities.org

USDA Rural Development Value-Added Producer Grant

Program Description

The Value-Added Producer Grant (VAPG) program provides grants on a competition basis to individual independent agricultural producers, groups of independent producers, producer-controlled entities, organizations representing agricultural producers, and farmer or rancher cooperatives to create or develop value-added agricultural products. The purpose of this program is to encourage agricultural producers to create and develop value-added producer owned businesses that will help increase farm income and marketing opportunities, create new jobs, contribute to community economic development, and enhance food choices for consumers.

Project Examples

Sample projects receiving VAPG funds include:

- In 2012, McKaskle Farm in Braggadocio, Missouri, which grows a variety of organic grains, received a planning grant to evaluate the financial feasibility of purchasing equipment to clean, process, and package their products. The VAPG grant allowed McKaskle to examine and evaluate options for scaling up business to sell to more local retailers.
- In 2013, the Wisconsin Food Hub Cooperative in Madison, Wisconsin received a working capital grant to assist in the startup of a regional fresh produce food hub and packinghouse created to enhance access to wholesale markets for the local farm economy. The food hub plans to aggregate local produce sold under the Wisconsin Farmed brand.

Eligibility, Uses, and Restrictions

Entities eligible to apply for VAPG funds include:

- individual agricultural producers;
- groups of agricultural producers;
- majority-controlled producer-based business ventures;
- organizations representing agricultural producers; and
- farmer or rancher cooperatives.

Agricultural producers include independent farmers, ranchers, and harvesters, including fishermen and loggers, who engage in the production or harvesting of an agricultural commodity.

There are two types of grants under VAPG:

1. Planning grants to fund economic planning activities such as the development of business plans and feasibility studies (including marketing plans) needed to establish viable marketing opportunities for value-added products; and
2. Working capital grants to fund the operation of a value-added business venture, specifically to pay for eligible expenses related to the processing and/or marketing of the value-added product.

Application and Financial Information

Grant and matching funds can be used for planning activities or for working capital expenses related to producing and marketing a value-added agricultural product. Examples of planning activities include conducting feasibility studies and developing business plans for processing and marketing the proposed value-added product. Examples of working capital expenses include:

- Processing costs
- Marketing and advertising expenses
- Some inventory and salary expenses

VAPG program Funding: \$44 million

Maximum Grant Amount: \$75,000 for planning grants; \$250,000 for working capital grants

Matching Funds Requirements: 50% of total project costs

More Information

More information about the Value-Added Producer Grant can be found at <http://www.rd.usda.gov/programs-services/value-added-producer-grants>

If you have questions, you can contact your nearest Rural Development Office. Additionally, you can reference this guide to walk you through the application process.

LOANS

Community Development Financial Institutions (CDFIs)

CDFIs are non-governmental entities, often non-profits, whose primary mission is to provide funding for small business development and affordable housing in underserved, economically distressed,

often rural communities. CDFIs receive funding from federal and state agencies, private foundations, financial institutions, and individuals.

Eligibility, Uses, and Restrictions

Eligible parties are companies and non-profits in the following sectors:

- Local and value-added agriculture
- Renewable energy and energy efficiency
- Sustainable forest products
- Recycling
- Heritage tourism and ecotourism
- Natural products and medicines
- Water conservation and water quality
- Vital community services

Loans can be used to leverage debt from traditional lending institutions. CDFIs often partner with other lenders to provide the unsecured debt needed to complete loan transactions. CDFI funds can be used to purchase equipment, real estate, and technology, and to provide working capital to grow sales through increased inventory, hiring, and marketing.

Application and Financial Information

Loan amounts typically range from \$5,000 to \$500,000 and terms depend on use of the capital. Interest rates are tied to the prime rate and are based on the loan purpose, terms of repayment, strength of collateral, and the borrower's credit history.

More Information

For more information on the national CDFI Program, see www.cdfifund.gov.

North Carolina Contact Information

Natural Capital Investment Fund

1665 N. Fort Myer Drive, Suite 130

Arlington, VA 22209

336-734-6902

<http://www.conservationfund.org/what-we-do/natural-capital-investment-fund>

Carolina Small Business Development Fund

3128 Highwoods Blvd., Suite 170

Raleigh, NC 27604

919-803-1437

<https://carolinasmallbusiness.org/>

Self-Help Ventures Fund

301 West Main Street

Durham, NC 27701

800-966-7353

<https://www.self-help.org/who-we-are/self-help-family/self-help-ventures-fund>

South Carolina Contact Information

CommunityWorks Carolina

107 W. Antrim Drive

Greenville, SC 29607

864-235-6331

<http://www.communityworkscarolina.org/>

SC Community Loan Fund

PO Box 21163

Charleston, SC 29413

843-973-7285

www.sccommunityloanfund.org

USDA Farm Services Direct Farm Ownership and Operating Loan

Program Description

The purpose of this loan is to provide family farmers and ranchers with the necessary capital to purchase land and assets or finance annual operating expenses. The USDA's Farm Services Agency (FSA) provides the direct farm ownership (DFO) and direct operating loan (DOL) programs to provide financing and assistance to family farms and ranchers to establish farms and ranches that achieve financial success and become self-financing.

Eligibility, Uses, and Restrictions

Eligible borrowers must be:

- U.S. citizens or U.S. non-citizen national or qualified aliens;
- unable to obtain credit elsewhere through commercial lenders
- have sufficient education, training, or experience;
- have an acceptable credit history; and
- be an owner or operator of a family-sized farm, at loan closing.

A family farm is defined as one in which the farm family provides all of the management and a substantial portion of the total labor.

For DFO loans, an applicant must also have substantially participated in the operation of a farm for at least three of the last 10 years, with flexibility to consider additional experience for at least one of the three years.

Loan Purposes

DFO loans may be used to purchase a farm or ranch, make capital improvements, pay closing costs, and pay for soil and water conservation improvements, including sustainable agriculture practices and systems.

DOLs may be used to pay the costs of reorganizing a farm or ranch, buy livestock or equipment, annual operating expenses, finance conservation costs, pay closing costs, comply with OSHA requirements, pay tuition for borrower training classes, refinance farm related operating loans, and family living expenses.

Application and Financial Information

Loan application forms are available online but farmers must apply for direct loan assistance in person at an FSA county office or USDA Service Center. FSA officials will meet with the applicant to assess all aspects of the proposed or existing farming or ranching operation to determine if the applicant meets the eligibility requirements. FSA loan programs are funded through the annual agriculture appropriations bill.

More Information

More information about FSA loan programs and applications can be found at <http://www.fsa.usda.gov/programs-and-services/farm-loan-programs/index>

Fact Sheets

http://www.fsa.usda.gov/FSA/newsReleases?area=newsroom&subject=landing&topic=pfs&newstype=prfactsheet&type=detail&item=pf_20140328_farln_en_loaninfo.html

FSA's Guide to FSA Farm Loans

http://www.fsa.usda.gov/Internet/FSA_File/fsa_br_01_web_booklet.pdf

To find your local FSA regional Service Center or state FSA office select your state from this website:

<http://offices.sc.egov.usda.gov/locator/app?agency=fsa>

USDA Farm Services Guaranteed Farm Ownership and Operating Loan

Program Description

The purpose of this program is to offer federal guarantees on commercial loans to family farms and ranchers for the purchase of land and assets or finance annual operating expenses. The USDA's Farm Services Agency (FSA) provides the guaranteed farm ownership (GFO) and guaranteed operating loan (GFL) programs to assist family farmers obtain commercial credit to establish or maintain a family farm or ranch.

FSA guarantees against potential loss of the commercial loan at 90 percent of the loss of principal and interest. A 95 percent guarantee is provided in the case of loans to refinance an existing DFO or DOL or for loans made in conjunction with a down payment loan or approved state beginning farmer program loan.

Eligibility, Uses, and Restrictions

Eligible borrowers must:

- Be a citizen of the U.S. (or legal resident alien);
- Have the legal capacity to incur the obligations of the loan;
- Have an acceptable credit history as determined by the lender and FSA;
- Have not had a previous FSA loan that resulted in a loss to FSA and not be delinquent on any federal debt;
- Be unable to obtain sufficient credit elsewhere without a guarantee at a reasonable rate and terms;
- Be the owner or operator of a family farm after the loan is closed;
- Not be delinquent on any Federal debt.

Loan Purposes

For GOLs, authorized purposes include:

- Payment of costs associated with reorganizing a farm to improve profitability;
- Purchase of livestock, equipment, and cooperative stock;
- Minor real estate improvements and other farm and home needs;
- Payment of annual operating expenses;
- Payment of costs for land and water development for conservation or use;
- Payment of loan closing costs; and
- Refinancing of debt incurred for any authorized DOL purpose.

For GFOs, authorized purposes include:

- Acquiring or enlarging a farm
- Making capital improvements
- Promoting soil and water conservation and protection
- Payment of loan closing costs
- Refinancing debt incurred for authorized DFO or DOL purposes

Application and Financial Information

Farmers apply for guaranteed loans as they normally would with local commercial lenders that make agricultural loans in their community. The lender analyses the farmer's business plan and financial condition.

If the farm loan proposal looks realistic, is financially feasible, and there is sufficient collateral, but it cannot be approved because it does not meet the lending institution's loan underwriting standards, the lender may apply for an FSA loan guarantee.

Once an applicant provides all the financial and organizational information to the lender, the lender submits a guaranteed loan application to the local FSA office and the request will be approved or disapproved within 30 days after receipt of a complete application.

The number of guaranteed loans that FSA can provide each year varies depending on the demand for loan guarantees and the amount of guarantee authority approved by Congress, as FSA loan programs are funded through the annual agriculture appropriations bill.

Source

http://www.sare.org/content/download/864/7092/file/building_sust_farms.pdf?inlinedownload=1

More Information

<http://www.fsa.usda.gov/programs-and-services/farm-loan-programs/guaranteed-farm-loans/index>

FSA's Guide to FSA Farm Loans

http://www.fsa.usda.gov/Internet/FSA_File/fsa_br_01_web_booklet.pdf

To find your local FSA regional Service Center or state FSA office select your state from this website:

<http://offices.sc.egov.usda.gov/locator/app?agency=fsa>

USDA Farm Services Farm Storage Facility Loan

Program Description

For most farmers, on-farm storage is essential to keeping food fresh and safe prior to marketing. The Farm Storage Facility Loan, administered by the USDA's Farm Service Agency, provides low-interest loans for producers to build or upgrade permanent facilities to store commodities, including fruit and vegetable cold storage, washing, packing, and handling buildings and equipment.

Eligibility, Uses, and Restrictions

The following products are currently eligible for farm storage facility loans:

- Corn, grain sorghum, rice, soybeans, oats, peanuts, wheat, barley or minor oilseeds harvested as whole grain
- Corn, grain sorghum, wheat, oats or barley harvested as other-than-whole grain
- Other grains (triticale, spelt, buckwheat, and rye)
- Hay and renewable biomass
- Pulse crops (lentils, chickpeas, dry peas)
- Fruits (includes nuts) and vegetables
- Honey and maple sap
- Meat, poultry, milk, eggs, cheese, butter, and yogurt
- Aquaculture
- Floriculture and hops

Eligible uses for these types of loans include:

- Grain storage cribs, bins, and silos, and related electrical equipment
- Equipment to maintain, improve, or monitor stored grain quality
- Grain drying equipment
- Hay and biomass storage structures
- Cold storage buildings and equipment
- Packing sheds and handling equipment
- Portable storage structures, portable equipment, and storage and handling trucks
-

Structures and equipment generally must have an expected useful life of at least 15 years, which includes both new and used equipment. Facilities that are not for the sole use of the borrower(s) are also not eligible.

For fruit and vegetable cold storage facilities, eligible uses include:

- New and used structures suitable for cold storage
- New and used walk-in prefabricated permanently installed coolers
- New and used permanently affixed cooling, circulating and monitoring equipment
- Electrical equipment integral to the proper operation of a cold storage facility
- An addition or modification to an existing storage facility

Additionally, fruit and vegetable producers may use FSFLs for structures and equipment required to get fruits and vegetables washed, treated and packed or otherwise required to maintain the quality of the crop.

Items that can be financed include:

- Baggers
- Batch dryers
- Boxing equipment
- Brush polishers
- Cold dip tanks
- Conveyors
- Drying tunnels
- Food safety-related equipment
- Hoppers
- Hydrocoolers
- Quality graders
- Scales
- Sealants
- Sorting bins/tables
- Vacuums
- Washers
- Waxers
- Weight grader

Eligible cost items include:

- Purchase price and sales tax
- Cost of new materials
- Shipping and delivery
- Site preparation/installation costs
- Off-farm paid labor
- Appraisals and legal fee

Financial Information and Application

Any farmer with on-farm or mobile storage needs can apply for a USDA Farm Storage Facility Loan as long as they have satisfactory credit, can demonstrate the ability to repay the loan and have proof of crop insurance, NAP coverage, or another risk management option. Loans can be up to \$500,000, though there is a streamlined process to apply for a microloan of up to \$50,000. A 15% down payment is required for all FSFLs except for microloans, which only require a 5% down payment. Loan terms are for 3, 5, or 7 years (microloans) or 7, 10, or 12 years (all other loans), and the interest rate is fixed by the U.S. Treasury (currently 2.5% as of April 2016).

More Information

Check out NSAC's Grassroots Guide for more information on [Farm Storage Facility Loans](#) or contact your local Farm Service Agency (FSA) [office](#) for a loan application.

More information about the USDA Farm Services Farm Storage Facility Loan can be found at <http://www.fsa.usda.gov/programs-and-services/price-support/facility-loans/farm-storage/index>

Farm Credit System

Program Description

The Farm Credit System was established in 1916 to support rural communities and agriculture with credit and financial services. Each of the nearly 75 independently owned and operated Farm Credit organizations is a cooperative owned by its customers. Farm Credit organizations provide more than \$235 billion in loans, leases, and related services.

Eligibility, Uses, and Restrictions

The following are eligible for the loan program:

- Agricultural producers of all sizes, commodities, and organic or conventional
- Young (35 years or younger), beginning (less than 10 years of agricultural experience), and small farms (annual sales of \$250,000 or less)
- Agricultural cooperatives

- Agribusinesses involved in every aspect of the food chain—production, processing, marketing, and distribution
- Rural infrastructure providers—energy, communications, water, and wastewater providers
- Lending to rural (2,500 persons or less) home owners for first or second homes, recreational land, home construction, and refinancing

Loan Uses

- Real estate and lots
- Homes
- Equipment
- Farm improvements
- Operating expenses
- Automobile and personal loans
- Specialized operations (poultry, dairy, greenhouse/nursery, etc.)

Application and Financial Information

For application and financial information, contact an individual Farm Credit organization agent located in your county.

More Information

Contact <https://www.farmcreditnetwork.com/> for more information about the Farm Credit System.

North Carolina Contact Information

AgCarolina Farm Credit, ACA
4000 Poole Rd., Raleigh, NC 27610
919-250-9500
www.agcarolina.com

Cape Fear Farm Credit, ACA
333 E. Russell St., Fayetteville, NC 28301
910-323-9188
www.capefearfarmcredit.com

Carolina Farm Credit, ACA
146 Victory Lane, Statesville, NC 28625
704-873-0276
www.carolinafarmcredit.com

South Carolina Contact Information

ArborOne Farm Credit
800 Woody Jones Blvd., Florence, SC 29501
843-662-1527
www.arborone.com

AgSouth Farm Credit, ACA
101 Northtown Dr., Spartanburg, SC 29303
864-585-6234
www.agsouthfc.com

AgFirst Farm Credit Bank
1901 Main St., Columbia, SC 29201
803-799-5000
www.agfirst.com

Whole Foods Market: Local Producer Loan Program

Program Description

Whole Foods Market is committed to supporting local products and the people who supply them. Through this commitment the grocery chain is also providing up to \$25 million low-interest loans to independent local farmers and food artisans.

According to Whole Foods Market, the purpose of the Local Producer Loan Program is:

- strengthen the partnerships between Whole Foods Market and local producers
- work with producers to expand the availability of high-quality local products for our customers
- support the communities where Whole Foods Market does business
- reinforce Whole Foods Market's commitment to environmental stewardship

Project Example

Company: Roots Organic Gourmet

Founded: 2005

Roots was started in 2005 as a cafe in the back of a little co-op in Asheville, NC. At that time, Roots was producing items that were served in the cafe as well as wholesaled to local markets. Their mission has been to use the highest quality organic and local ingredients, keep their prices reasonable and provide a channel for local growers to sell their product. Self-proclaimed as "The Micro-Brew of Hummus," Roots is a mission driven company, building a family-friendly organization that pays competitive living wages and supports the community through donation and outreach. They source all-natural ingredients and buy locally as often as possible. They are using the proceeds from their loan to streamline their production process which will lower cost of goods and allow them to enhance their product selection.

Source: <http://www.wholefoodsmarket.com/profiles-loan-recipients/NC>

Eligibility, Uses, and Restrictions

In order to be eligible for the loan program producers:

- must meet Whole Foods Market's Quality Standards and standards for animal welfare
- use funds for expansion and capital expenditures (e.g., buy more animals, invest in new equipment and infrastructure, or expand crops), not operating expenses
- have a viable business plan and adequate cash flow to service debt

Due to liquor laws, Whole Foods Market is unable to offer loans to producers of alcoholic beverages.

Application and Financial Information

Whole Foods Market promises a streamlined loan process with fees, interest rates, and paperwork minimized.

- Targeted loan amounts between \$1,000 and \$100,000 (maximum \$25,000 for start-ups)
- Loan amount not to exceed 80% of total project cost
- Low, fixed interest rates (currently between 5% and 9%)
- No penalty for early repayment
- Collateral required

- One-time minimal processing fee covers administrative expenses, including credit report
- Approval and terms dependent on product characteristics, risk assessments and use of proceeds
- Opportunity to apply for additional financing after one year if initial loan is in good standing
- Existing vendor relationship with Whole Foods Market preferred
- Applications accepted on a rolling basis

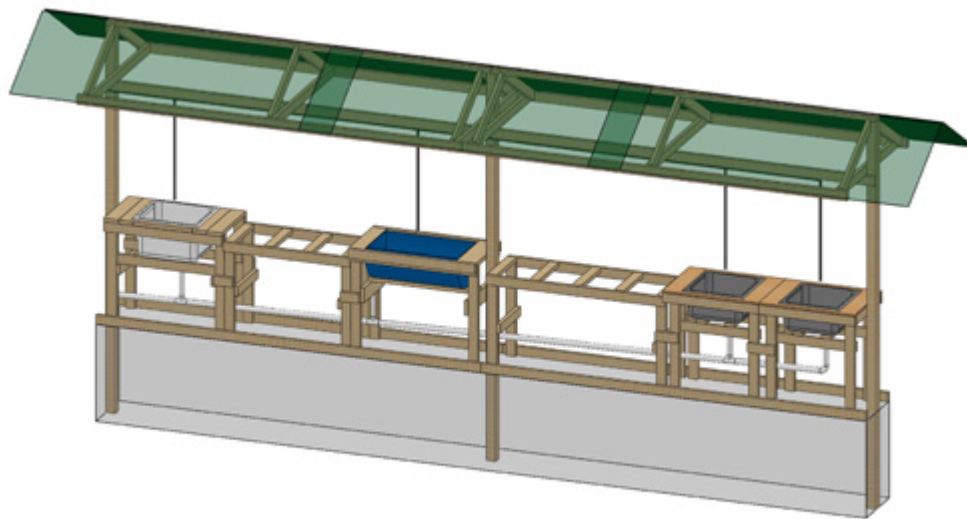
More Information

For an application, talk to your local Whole Foods Market contact or see:

wholefoodsmarket.com/loans. For general information, email LPLP@wholefoods.com or call 512-542-0895.

Vegetable Wash Station Design 1

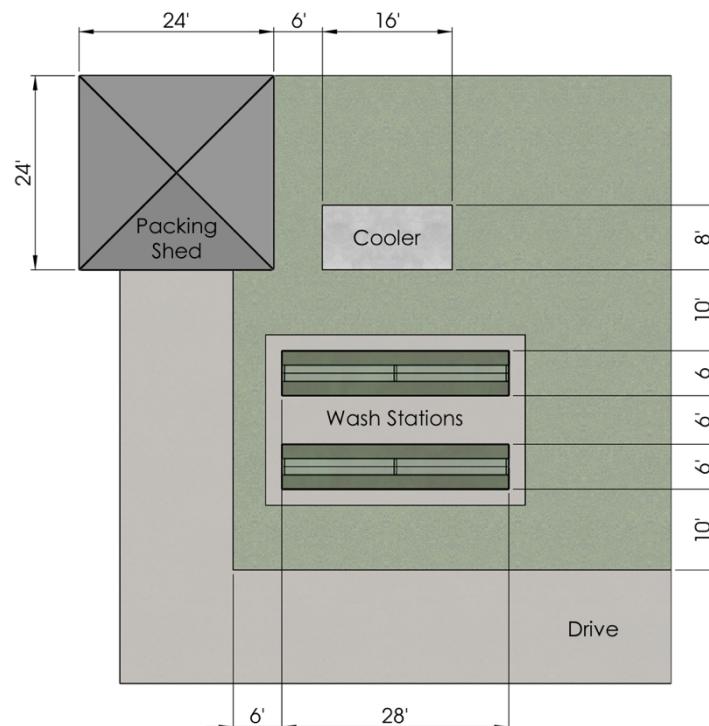
Based on design at One Step at a Time Gardens



This system is designed to provide a simple and effective method of hand washing fresh vegetables using materials commonly available at a modest cost from a large hardware store or building material retail outlet.

1) Selecting a site

- Select the site before beginning construction.
- Site needs to be level: 24 ft. length by 3 ft. wide.
- Site needs to have ample workspace around it, roughly 6 feet on each side and around each end.
- Wash station roof requires overhead clearance of 9 ft. (plus a little more) along entire length of station.
- Locate near vegetable pack-out and cooler locations. Once the vegetables are clean and have finished drip-drying, it is helpful to minimize the transport distances to these two facilities, as they are the next step in the post-harvest process.



Vegetable Wash Station Design 1

Based on design at One Step at a Time Gardens

2) Purchase materials for construction

- Lumber, roofing and sinks and drain line parts are readily available at hardware/lumber retail stores.
- Supplies for the water line and the blue tub can be purchased from a commercial vegetable irrigation supply company.
- For the blue tub use a 55-gallon, food-grade plastic drum, usually available from commercial food processing companies.
- Treated lumber required for wash station:
 - 3 - 12 ft. 4 x 4's
 - 29 - 12 ft. 2 x 4's
 - 2 - 8 ft. 2 x 6's
 - 1 - 8 ft. 2 x 2's
 - 1 - 4 x 8 ft. sheet of ¾-inch untreated plywood
- Recycled HDPE plastic lumber required for drying trays:
 - 9 - 10 foot 1 x 4's

Note for organic growers:

If the producer is organic certified, the use of treated lumber may be in conflict with organic certification, so be sure to contact your certifying agency before purchasing materials. Metal poles with a poured cement base may be used as a replacement for the 4 x 4 roof supports, but alternative attachment procedures will be required. Contact your local lumber supply company for direction.

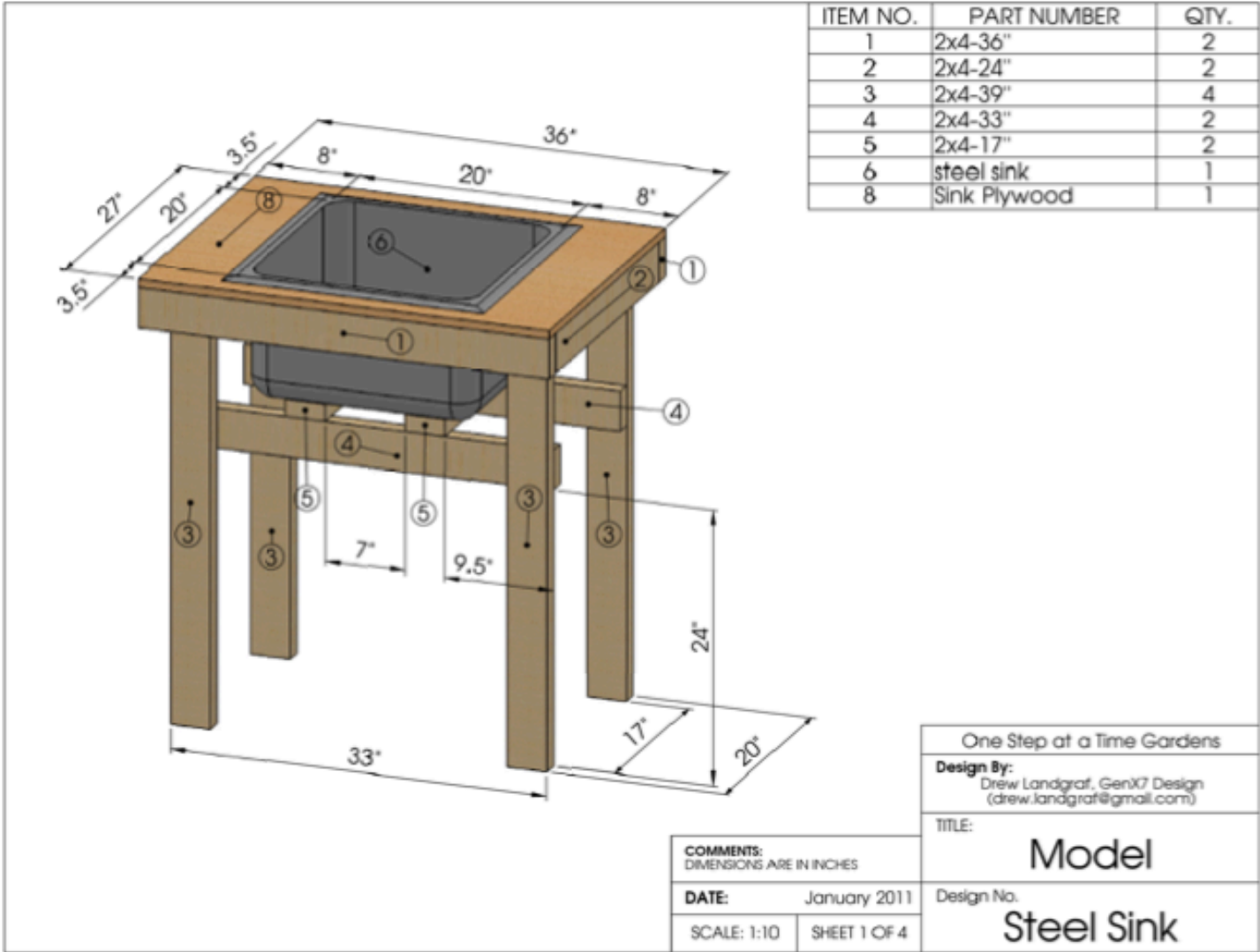
Similarly, untreated lumber may be used in place of the 2 x 2's, 2 x 4's, and 2 x 6's. A food-grade water repellant should be applied to the wood surfaces, to provide appropriate outdoor protection of the wood surfaces. Keep in mind that this wash station is designed such that the vegetables do not come in contact with the wood surfaces at any point.

3) Build the wash station

- Install the three 4x4 support poles to provide stability for the roof. Dig holes so that each pole is 3 ft. into the ground.
- Construct individual components of the wash station.

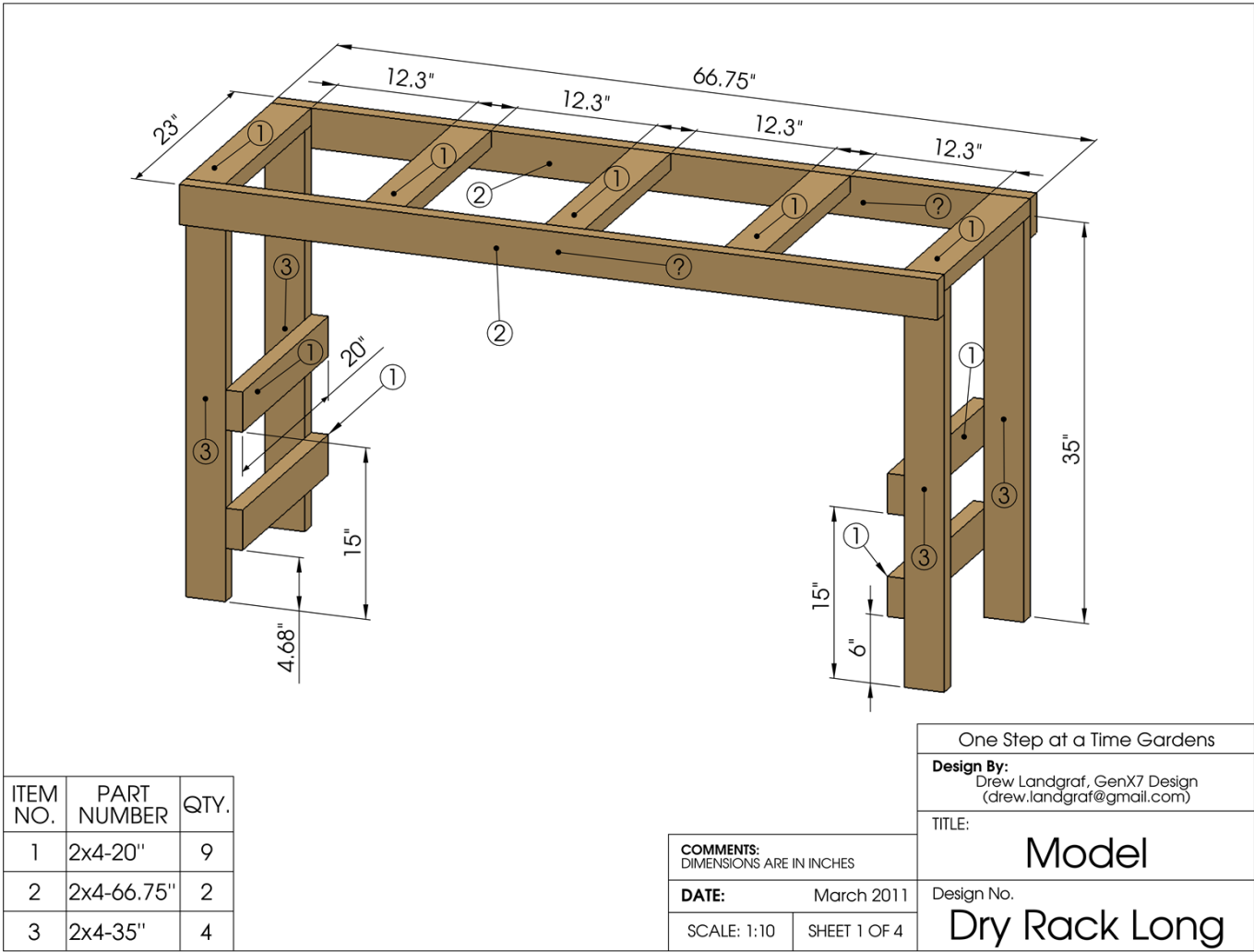
Vegetable Wash Station Design 1
Based on design at One Step at a Time Gardens

- Steel Sink



Vegetable Wash Station Design 1
Based on design at One Step at a Time Gardens

- Drying Rack Long



Vegetable Wash Station Design 1
Based on design at One Step at a Time Gardens

- Blue Tub Sink

| ITEM NO. | PART NUMBER | QTY. |
|----------|-------------------|------|
| 1 | 2x6-23" | 1 |
| 2 | 2x4-47.5" | 4 |
| 3 | 2x8-23" | 1 |
| 4 | 2x4-39" | 4 |
| 5 | 2x6-40.5" | 1 |
| 6 | 2x6-20" | 2 |
| 7 | blue plastic sink | 1 |

One Step at a Time Gardens

Design By:
Drew Landgraf, GenX7 Design
(drew.landgraf@gmail.com)

TITLE:
Model

Design No.
Blue Tub Sink

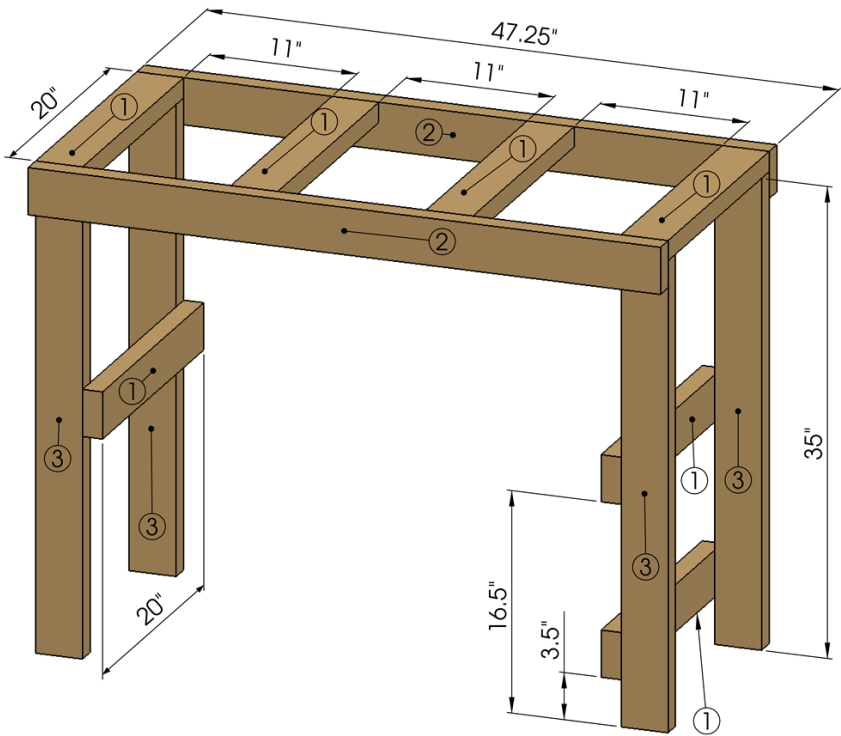
COMMENTS:
DIMENSIONS ARE IN INCHES

DATE: March 2011

SCALE: 1:10 SHEET 1 OF 4

Vegetable Wash Station Design 1
Based on design at One Step at a Time Gardens

- Drying Rack



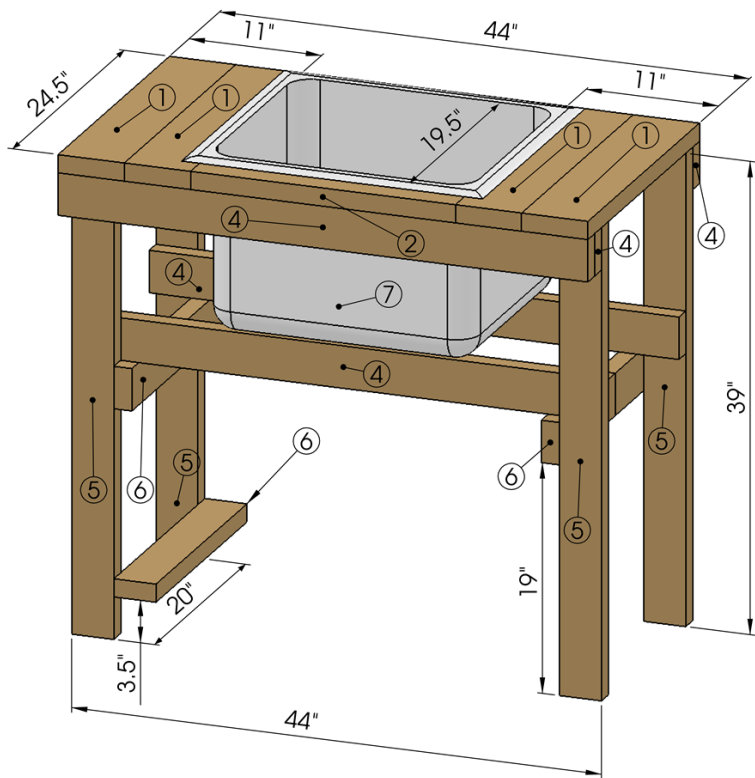
| ITEM NO. | PART NUMBER | QTY. |
|----------|-------------|------|
| 1 | 2x4-20" | 7 |
| 2 | 2x4-47.25" | 2 |
| 3 | 2x4-35" | 4 |

| | |
|--|--|
| One Step at a Time Gardens | |
| Design By: Drew Landgraf, GenX7 Design (drew.landgraf@gmail.com) | |
| TITLE: Model | |
| Design No. Drying Rack | |

| | |
|---------------------------------------|--------------|
| COMMENTS: DIMENSIONS ARE IN INCHES | |
| DATE: | March 2011 |
| SCALE: 1:9 | SHEET 1 OF 4 |

Vegetable Wash Station Design 1
Based on design at One Step at a Time Gardens

- Plastic Sink



| ITEM NO. | PART NUMBER | QTY. |
|----------|--------------|------|
| 1 | 2x6-24.5" | 4 |
| 2 | 2x4-22" | 1 |
| 3 | 2x2-22" | 1 |
| 4 | 2x4-44" | 5 |
| 5 | 2x4-39" | 4 |
| 6 | 2x4-20" | 3 |
| 7 | plastic sink | 1 |

| | |
|---------------------------------------|--------------|
| COMMENTS: DIMENSIONS ARE IN INCHES | |
| DATE: | March 2011 |
| SCALE: 1:10 | SHEET 1 OF 4 |

| | |
|--|--------------|
| One Step at a Time Gardens | |
| Design By: Drew Landgraf, GenX7 Design (drew.landgraf@gmail.com) | |
| TITLE: | Model |
| Design No. | Plastic Sink |

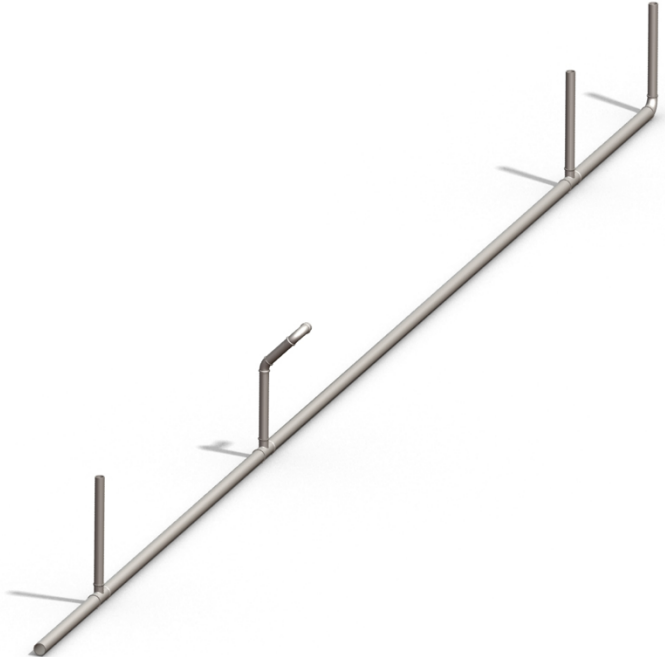
Vegetable Wash Station Design 1

Based on design at One Step at a Time Gardens

- When each component is completed, attach to the base-line layout

About sinks and drain lines

- It is helpful to attach each sink section with the side of the sink across from the drain slightly higher than side closest to the drain. A ½-inch elevation of the side away from the drain may be sufficient. This will facilitate smooth draining of the sink water after each use.
- Once all components are attached to the base line, the drain lines can be assembled to fit individual sinks.
 - Drain Line



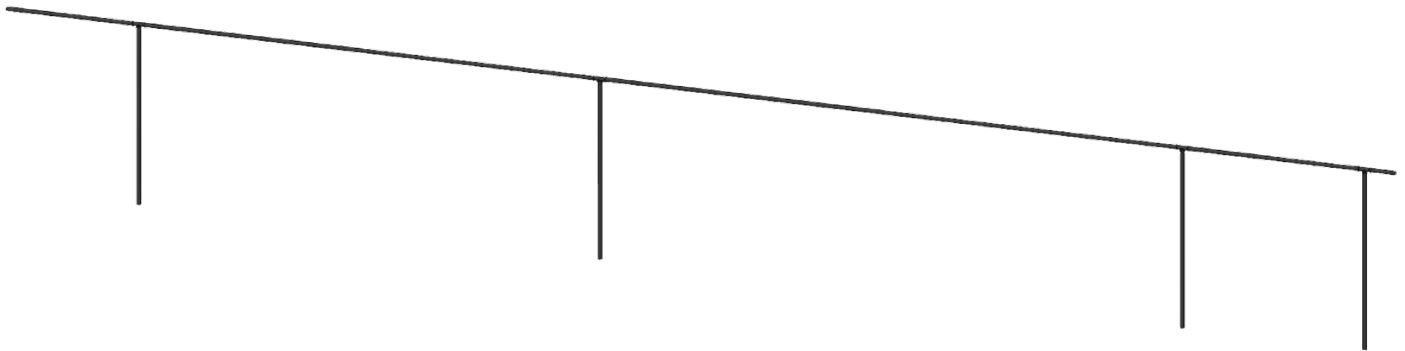
| ITEM NO. | PART NUMBER | QTY. |
|----------|-----------------------|------|
| 1 | PVC T 2"D-2"D-1.5"D | 3 |
| 2 | PVC 1.5"D-17.93" | 1 |
| 3 | PVC 1.5"D-1" | 1 |
| 4 | PVC 1.5"D-5.48" | 1 |
| 5 | PVC 1.5"D-12.09" | 1 |
| 6 | PVC 2"D-67.76" | 1 |
| 7 | PVC 2"D-129.26" | 1 |
| 8 | PVC 1.5"D-17.35" | 1 |
| 9 | PVC 2"D-32.02" | 1 |
| 10 | PVC 1.5"D-16.72" | 1 |
| 11 | PVC 2"D-23.8" | 1 |
| 12 | PVC 45elbow 1.5"D | 1 |
| 13 | PVC shim 1.5"D | 4 |
| 14 | PVC Elbow 1.5"D | 1 |
| 15 | PVC Elbow 1.5"D-2.5"D | 1 |

- When constructing lines to individual sinks, they can be fixed drain lines as shown in the drawings, or can be made more flexible by installing 1 ½-inch flex PVC tubes. The flex tubes allow easier alignment of the drain lines.
- Remember to create a slope in the drain line, starting with the hand wash sink (highest) to the exit end of the line. A 6-inch drop along this length will create sufficient gravity flow to drain the dirty wash water.
- Attach a sufficient length of 3-inch layflat hose to the exit end of the drain line, to carry this dirty water to the drain field for the wash station. A hose clamp works well to clamp the layflat hose to the 2-inch PVC drainpipe. This clamp easily can be removed to facilitate the removal of small root crops that may clog the drain line.
- Supports for the drain line can be made by attaching 2 x 4 cross supports at four places along the drain line as shown in the drain line and wash station drawings.
- Attach water line support boards and roof support boards to the support posts.
- Construct roof trusses and attach to structure.
- Install water lines in the station.
 - Water Hose Line

| ITEM NO. | PART NUMBER | QTY. |
|----------|---------------------|------|
| 1 | Plastic 0.75"D-34" | 1 |
| 2 | Plastic 0.75"D-37" | 4 |
| 3 | Plastic T 0.75"D | 4 |
| 4 | Plastic 0.75"D-113" | 1 |
| 5 | Plastic 0.75"D-89" | 1 |
| 6 | Plastic 0.75"D-25" | 1 |
| 7 | Plastic 0.75"D-5" | 1 |

Vegetable Wash Station Design 1

Based on design at One Step at a Time Gardens

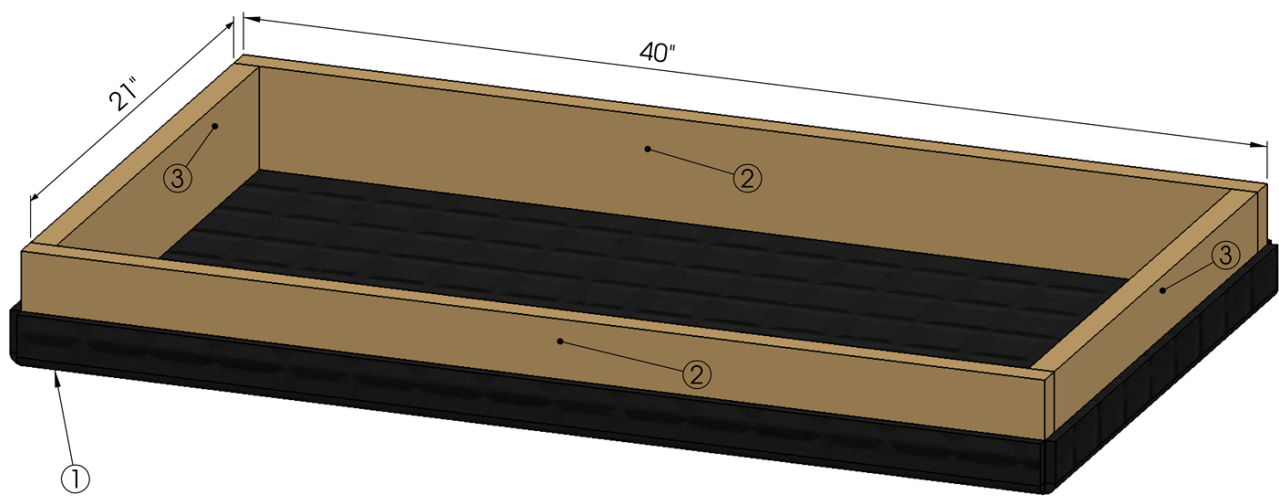


4) Build tray for air-drying washed vegetables.

- This tray sits on the drying rack with the long side of the tray perpendicular to the length of the rack. Two trays can fit on each drying rack.
- The bottom of the tray is made from plastic netting that has $\frac{1}{4}$ -inch holes. The netting is cut larger than the bottom of the tray, and then each corner is cut on the diagonal to the dimension of the bottom opening in the tray. Fold the sides of the netting up onto the corners of the 1 x 4 sides of the tray and attach netting to sides of the tray by nailing $\frac{3}{4}$ -inch stainless steel staples through the netting into the sides of the tray.
- Construct as many trays as are needed (6-8 should be sufficient) to allow vegetables to be transported to the pack-out space in trays, while others are used to continue washing vegetables.

○ Drying Tray

| ITEM NO. | PART NUMBER | QTY. |
|----------|-------------|------|
| 1 | Mesh | 1 |
| 2 | 1x4-40" | 2 |
| 3 | 1x4-21" | 3 |



Vegetable Wash Station Design 1

Based on design at One Step at a Time Gardens

5) Make covers for each sink.

- Covers help keep windblown leaves and dust out of sinks when the station is not in use.
- Cut three pieces of ¾-inch plywood, each measuring 24 x 24 inches. They will cover the two stainless steel sinks and the plastic sink.
- Cut a fourth piece, measuring 24 x 36 inches. This will cover the blue tub sink.
- Apply several coatings of food-grade water repellent to all surfaces of the plywood sink covers. This will extend the life of the covers, which are exposed to outdoor weather elements.

Cost: The materials for this complete system can be purchased for a little under \$1,000.

Vegetable Wash Station Design 1

Based on design at One Step at a Time Gardens

GAP Certifiable Wash Station

New Entry Sustainable Farming Project - Costs of Leopold Center Design

Ogonowski Memorial Fields, Dracut, MA

| Pressure Treated Lumber | Quantity | Unit Price | Price |
|-------------------------|----------|------------|-----------------|
| 2"x4"x8' | 19 | \$2.79 | \$53.01 |
| 2"x4"x10' | 2 | \$3.97 | \$7.94 |
| 2"x4"x12' | 20 | \$4.97 | \$99.40 |
| 2"x6"x10' | 3 | \$5.97 | \$17.91 |
| 2"x2"x8' | 1 | \$2.97 | \$2.97 |
| 2"x8"x8' | 1 | \$6.97 | \$6.97 |
| 4"x4"x12' | 3 | \$12.97 | \$38.91 |
| Subtotal | | | \$227.11 |

| Composite (Plastic) Lumber | Quantity | Unit Price | Price |
|----------------------------|----------|------------|-----------------|
| 5/4"x6"x12' | 6 | \$25.97 | \$155.82 |
| Subtotal | | | \$155.82 |

| Roofing Material | Quantity | Unit Price | Price |
|--|----------|------------|-----------------|
| 36"x8' Green Shelterguard Tin | 9 | \$25.78 | \$232.02 |
| 10'6" Shelterguard Ridgecap | 3 | \$27.38 | \$82.14 |
| TEKS 2" drill point roofing screws (50 ct) | 2 | \$9.68 | \$19.36 |
| Subtotal | | | \$333.52 |

| Plumbing Materials | Quantity | Unit Price | Price |
|--------------------------------|----------|------------|---------|
| 3/4" PVC SxS coupler | 3 | \$0.49 | \$1.47 |
| 3/4" PVC male adapter SxMPT | 2 | \$0.59 | \$1.18 |
| 3/4" PVC T SxSxS | 2 | \$0.79 | \$1.58 |
| 3/4" PVC Elbow SxS | 1 | \$0.49 | \$0.49 |
| 3/4" PVC Elbow SxFPT | 1 | \$0.65 | \$0.65 |
| 3/4" 10' SCH 40 PVC | 4 | \$1.97 | \$7.88 |
| 3/4" 2-hole EMT strap (3 pack) | 2 | \$0.99 | \$1.98 |
| 3/4" PVC End cap | 1 | \$0.32 | \$0.32 |
| 3/4" Female Hose End Mender | 3 | \$2.29 | \$6.87 |
| 3/4" Male Hose End Mender | 3 | \$1.99 | \$5.97 |
| 3/4" Y Hose splitter | 1 | \$2.29 | \$2.29 |
| PVC Glue and Primer | 1 | \$7.51 | \$7.51 |
| 15' Garden Hose | 1 | \$7.97 | \$7.97 |
| Spray nozzles | 2 | \$3.97 | \$7.94 |
| 2" PVC coupler SxS | 2 | \$0.99 | \$1.98 |
| 2" PVC 45 Deg Elbow SxS | 2 | \$1.49 | \$2.98 |
| 2" 10' SCH 40 PVC | 3 | \$5.96 | \$17.88 |
| 2" PVC Elbow SxS | 1 | \$1.02 | \$1.02 |
| 2"x2"x1.5" PVC T SxSxS | 2 | \$4.17 | \$8.34 |

Vegetable Wash Station Design 1

Based on design at One Step at a Time Gardens

| | | | |
|-----------------------------------|---|--------|-----------------|
| 2"x1.5" PVC reducer SxS | 1 | \$1.37 | \$1.37 |
| 1.5" 10' SCH 40 PVC | 1 | \$4.51 | \$4.51 |
| 1.5" PVC 45 Deg Elbow SxS | 2 | \$1.31 | \$2.62 |
| 1.5" PVC Cleanout Adapter SPGxFPT | 3 | \$1.40 | \$4.20 |
| 1.5" PVC Coupler SxS | 3 | \$0.64 | \$1.92 |
| 8oz Thread Sealer | 1 | \$9.99 | \$9.99 |
| Teflon tape 0.5"x260" | 1 | \$1.05 | \$1.05 |
| 14oz Plumber's putty | 1 | \$2.05 | \$2.05 |
| Subtotal | | | \$114.01 |

| Sink Materials | Quantity | Unit Price | Price |
|-------------------------------|----------|------------|-----------------|
| 55 gallon food grade drum | 1 | \$15.00 | \$15.00 |
| 14.5 gallon drum utility sink | 1 | \$58.00 | \$58.00 |
| Faucet | 1 | \$12.12 | \$12.12 |
| Kwik fit basket strainer | 1 | \$9.96 | \$9.96 |
| Bath drain with strainer | 2 | \$3.47 | \$6.94 |
| Universal tub stopper (1.5") | 2 | \$4.47 | \$8.94 |
| Subtotal | | | \$110.96 |

| Fasteners | Quantity | Unit Price | Price |
|-----------------------------|----------|------------|----------------|
| 2.5" Nails | 6 | \$1.99 | \$11.94 |
| 2.5" Galvanized deck screws | 3 | \$3.99 | \$11.97 |
| 25 ct Exterior Saber screws | 3 | \$6.49 | \$19.47 |
| 1-5/8" exterior screws | 1 | \$8.47 | \$8.47 |
| 3.5" 16d nails | 1 | \$4.24 | \$4.24 |
| 3.5" screws | 1 | \$7.98 | \$7.98 |
| Subtotal | | | \$64.07 |

| Miscellaneous | Quantity | Unit Price | Price |
|------------------------------------|----------|------------|----------------|
| 3'x15' Black PVC hardware net | 1 | \$16.44 | \$16.44 |
| Sono tubes (8"x48") | 3 | \$5.17 | \$15.51 |
| 50 Quickrete fence post mix | 3 | \$4.98 | \$14.94 |
| 3/4" 4'x8' Plywood | 1 | \$19.25 | \$19.25 |
| 10oz Heavy Duty Liquid Nails | 1 | \$3.29 | \$3.29 |
| General Finishes Salad Bowl Finish | 1 | \$16.99 | \$16.99 |
| Subtotal | | | \$86.42 |

| | | |
|--------------------|--|-------------------|
| Total Price | | \$1,091.91 |
|--------------------|--|-------------------|